THE SCOTTISH
GEOGRAPHICAL
MAGAZINE

Vol. 68, No. 2 September 1952

POPULATION AND NATURAL RESOURCES

By Andrew C. O'Dell

Two decades passed between the fourteenth and fifteenth census enumerations, and during the second decade, 1941-51, many attempts were made in conjunction with economic and planning reports to assess the changes of population which were occurring during a period of upheaval. In July 1951 the Preliminary Report of the Fifteenth Census was published, and this review is largely based on this provisional report.

First is presented Figure 1, showing the intercensal change by parishes with emphasis on the areas of decline. Areas with a stipple or unruled represent those where during the last twenty years population has declined. The story is a sad one, for in over half the area of Scotland the total number of people has declined, and further, in some of the parishes which appear as showing an increase, there is a local focus which has overweighed losses experienced in most of the parish. In the islands is a loss which appears to be primarily a drift to the county towns. In much of the upper land of the Highlands and Southern Uplands occurred a loss, whilst in the Central Lowlands declines appear in as varied habitats as the Slamannan Plateau and Glasgow. Areas with the severe reduction of at least one per cent. per annum (*not* twenty per cent. in twenty years) are stippled, and it is seen that these tend to be, but are not exclusively, peripheral.

At the last Census the total population, despite war casualties of 34,000, is more than recovered from the decline to 4·84 million recorded in 1931. Fig. 2 shows the male population by counties, and here the counties which recorded their maximum at a particular Census year are marked by a stipple, while those which have passed the peak for male population are shown in black. The Return for 1921 (which gave a peak for Bute) has been ignored as, owing to the late date of the 1921 Census, it was warped by holiday migration. The story is of continuing loss : first in the Highlands and Islands, secondly in the Southern Uplands, then in the North East, and finally in the Central Lowlands, where Lanarkshire is now below a peak. The broad view

is one of peripheral retreat and concentration upon the more industrial counties. This is a repetition, on a greater scale, of the loss in the islands towards the county towns, which have administrative, commercial and industrial functions. In Fig. 3 are shown, by isotypes, the twenty counties which had recorded by 1951 a higher male population in the previous 150 years, and these are arranged in order of declining severity, from Sutherland with 50 per cent. loss below the maximum to Lanarkshire with only 1 per cent. Generally, but not precisely, those counties which have long passed their peak have lost the greatest percentage of their man-power and again the story strikes clear, of first in the Highlands and Islands, secondly in the Southern Uplands, then the North East losing male population. The female losses are similar, and this means that assets of a surplus labour source, whether to develop the outer regions or to supply the industrial counties, have largely vanished. Unfortunately, statistics as to age-composition are not yet available, but it is known that the population of these peripheral areas is older than the average for Scotland and that a high proportion are too old for child-bearing or strenuous occupations.

Examples will now be taken from selected regions and attention drawn to new factors of utilisation which may alter the present population situation. First taking the well-known Central Lowlands (Fig. 4) with their coalfields, it is clear that the local decline of output and of industrial activity has led to sufficiently great migration as to result in a decline in some parish totals. Since the economic blizzard of the 'thirties there has been, in some districts, a substantial loss of population. Glasgow itself can no longer boast of being the second largest city in Britain. Such increases as have occurred in the Clyde Valley are on the margins of the older urbanised areas and are doubtless encouraged by the provision of Trading Estates. Within the Tweed Valley the parishes, except at the western end of the Merse and those covering the nearby textile and hosiery towns, show a decline : the decline of the Tweed Valley has been studied intensively by Sir Frank Mears, and I will not trespass upon his theme.

For a northern area has been selected the district extending west from Beauly and Cromarty Firths. During the last two centuries population has declined in both the glaciated uplands and in the more fertile coastal lowlands. Yet is there a sign of a regression, or indeed of a reversal, of this trend ? Mr. Rendal Govan wishes to see the east of Ross and Cromarty redeveloped with industry. Meanwhile on the western fringe the man-power engaged on construction of hydro-electric schemes has increased the population. Unfortunately, the great increase can only be ephemeral : in 1949 over 11,000 were employed on construction of works and transmission lines, and under 3000 on generation and maintenance in the whole of the North of Scotland Hydro-Electric Board area. Even if chemical industries be established, judging by such plants in the French Alps, the man-power required is small. Still, if the previous trend is arrested by a slight permanent increase this would be a new feature in these upland areas. Perhaps, too, time may see, without waiting for natural accretion, some of the reclamations of foreshore as suggested by Professor A. G. Ogilvie.

These would aggregate in this area to over eight square miles, and in the unexpectedly mild climate experienced at the head of the Moray Firth would support an appreciable agricultural population.

Fig. 1. Population changes in Scotland, by civil parishes, 1931-1951, based on the Preliminary Report of the Fifteenth Census. Decrease : under 1%, blank ; over 1%, stippled. Increase : under 1%, wide hatching ; over 1%, close hatching.

Meanwhile there is another factor at play which may reverse the population decline and restore to the rural scene the asset of younger, active population. Fig. 5 shows the lands held by the Forestry Com-

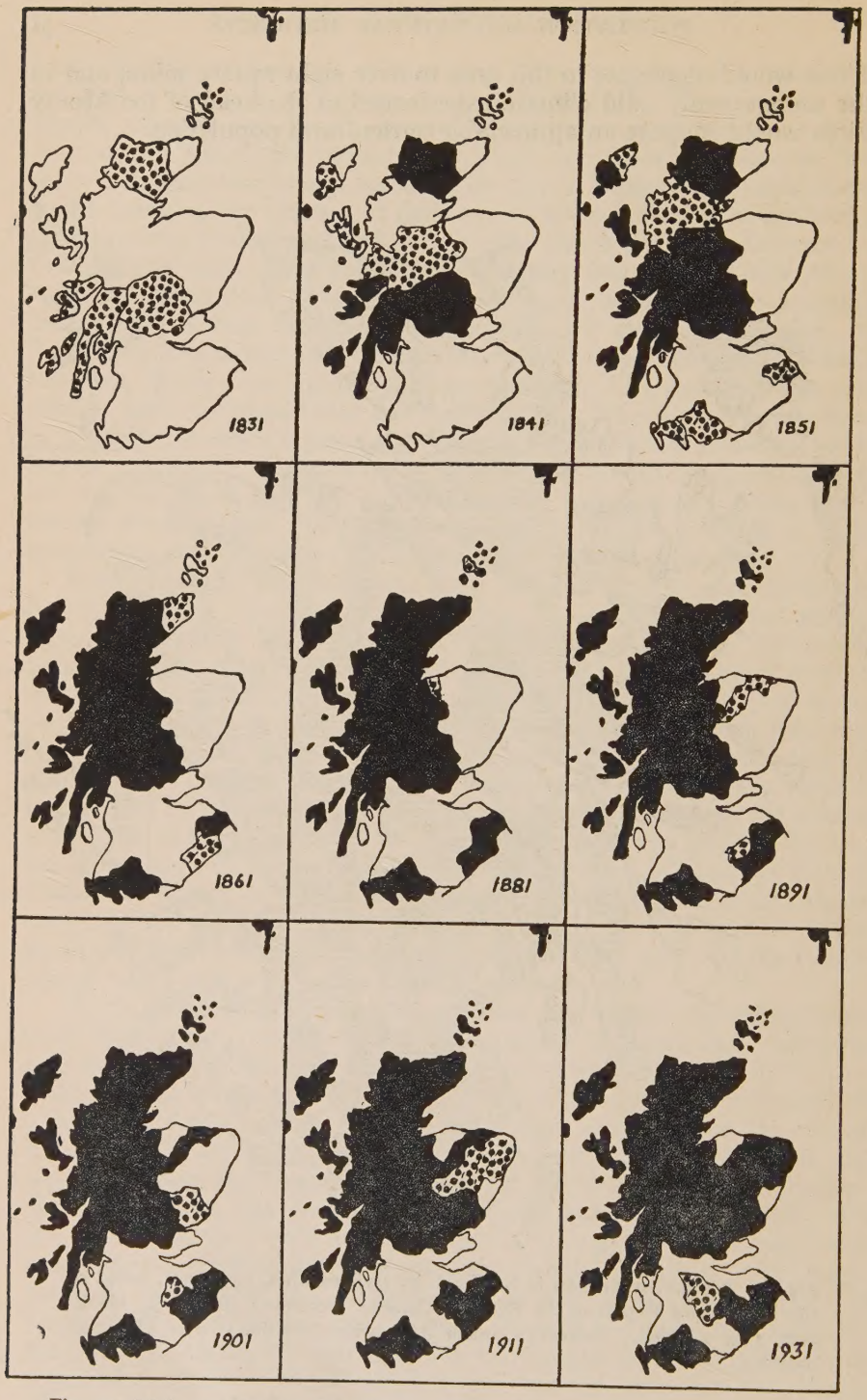

Fig. 2. Male population of Scotland, 1831-1931. Stippled : Counties which recorded their maximum at a particular census. Black : Counties which have passed the peak for male population at an earlier census.

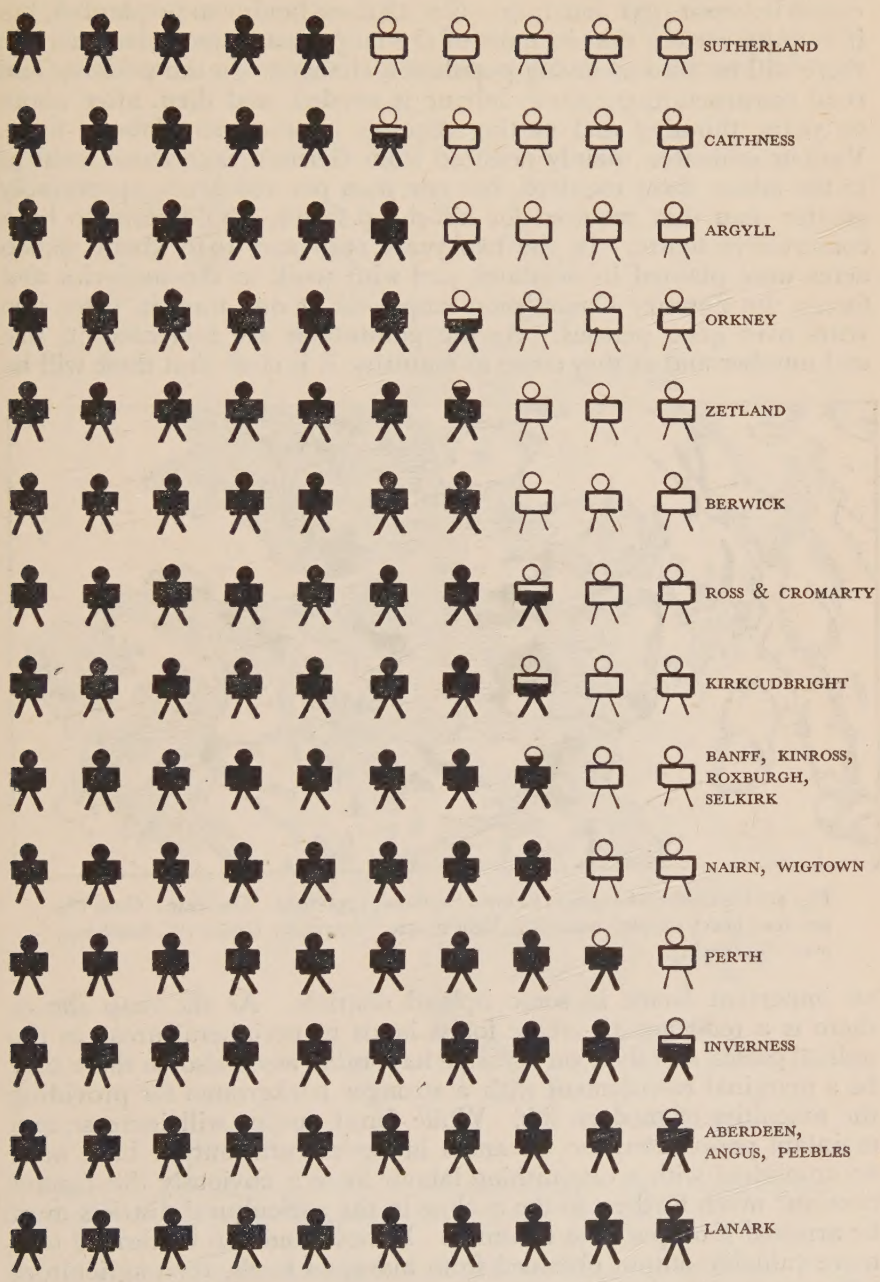

Fig. 3. Male population of twenty counties in Scotland which by 1951 had recorded a higher male population in the previous 150 years. Solid figures = 1951 Return as percentage of maximum Return.

mission in 1947 set against the background of areas of population decrease between 1931 and 1951. Not all these lands can be planted, but it is quite certain that in most of the large estates on upland terrain there will be accompanying population changes. In the planting and road construction transitory labour is needed, and then, after about 20 years, thinning and cutting requires a permanent labour force. Various estimates, mainly deduced from German experience, exist as to the labour force required, but one man per 100 acres, appreciably greater than that required for hill-sheep farms, would seem to be a conservative figure. In the two years 1948 and 1949 about 36,000 acres were planted in Scotland, and with work in the nurseries and forests the Forestry Commission employed at one time in these two years over 4000 persons. As the plantations are increased in size and number and as they come to maturity, it is clear that these will be

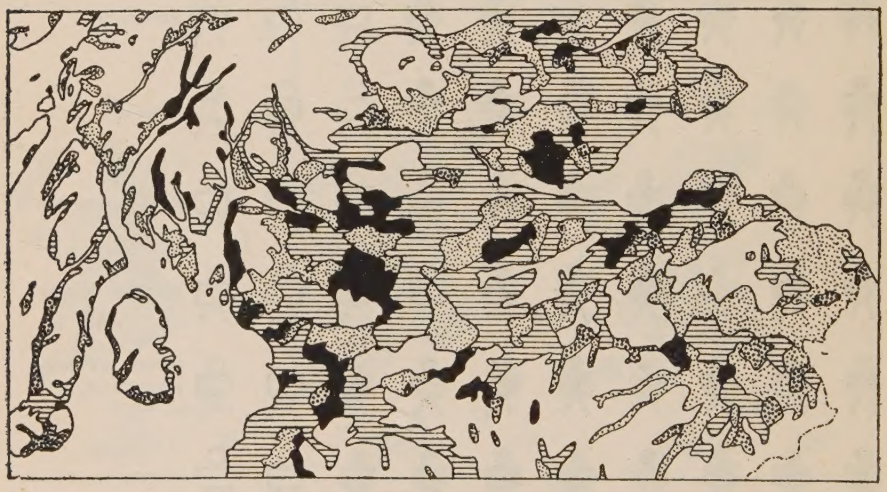

Fig. 4. Population changes in Central Scotland, 1931-1951. Decrease: Over 1% per year, heavy stipple; under 1%, light stipple. Increase: Under 1%, hatching; over 1%, black.

an important factor in some upland districts. As the map shows, there is a tendency to create forest lands in peripheral areas to the upland passes, and these on occasion have other assets also, so there may be a marginal resettlement with a stronger background for providing the amenities of modern life. While forest output will increase and maintain population, the advances in agricultural output have been accomplished with a diminishing labour force : obviously this cannot continue much further, so the decline in the agricultural districts must be arrested if output is to continue. If fresh land can be farmed or a more valuable output obtained from marginal lands, then agriculture will support more people.

Attention should now be placed on the areas of increase. First, the anomalies of temporary increase such as where Hydro-Electric schemes are in progress must be discredited. It is to be hoped that when the detailed County Reports appear, figures will be available by

parishes as to this feature, in the same way as earlier Census Reports stated the number of navvies engaged on railway construction. Second, it is clear how outwith the Central Lowlands areas of increase tend to be coastal or along lines of better communication, and some of these are

Fig. 5. Lands held by the Forestry Commission in 1947 : black. Areas showing increase in population, 1931-1951 : stippled.

due to the presence of a large R.A.F. Station or a new hospital. Whilst there has been a general increase in the Central Lowlands within this region, the chief increases have been marginal to the greater urban units. Indeed the four cities each show a marginal increase.

People are a resource in that without them work cannot be done, and at the same time to meet their needs for work factories have to be

provided. As the tempo has changed in Scotland from the heavy industries to the lighter, so new factory accommodation has had to be provided, and between September 1945 and the end of 1949 about $4\frac{3}{4}$ million square feet of factory space were built or allocated from ex-Government factories. This space gave work for a labour force of about 123,000 persons. To meet the immediate needs a further $1\frac{1}{4}$ million square feet are required, and even this is insufficient to cope with the unemployment which can be expected if re-armament ceases in the next few years.

The labour force of Scotland is given as about 2 million, of whom one-third are women. This is an increase over the pre-war level but not so great as the statistics suggest, for they are on a wider basis under the National Insurance Acts than under the Unemployment Insurance Acts. The crude figure of the number of people employed is not sufficient to judge the value of the labour force as conditions are changing. Fewer people can cope with labour needs as mechanisation proceeds : agriculture provides an excellent example of this, while electricity makes living conditions less arduous and therefore, theoretically, frees energy for productive work. On the other hand, the raising of the school leaving age, the time now spent in National Service, the shorter hours worked and longer holidays all mean that out of the larger population there are less hours of work. Also, while bureaucracy consumes labour in its execution, it also makes heavy demands on office work in industry ; probably all of us would agree that the machinery of government consumes a larger labour expenditure than ever before. Therefore, even if the traditional skill in engineering, textile and other industries is maintained, the numbers engaged no longer can be a simple criterion of changes in significance.

To conclude, Scotland has now a population of just over 5·1 million, that is three and one-quarter times the total of 1801 and one-eighth greater than in 1901. Unlike these earlier periods, the population is biassed to the older age-group, and while there are fewer non-workers at the youthful end, even without the reduction caused by raising the school leaving age, there are many more folk who have passed retiring age.

Calculations by some writers, prior to the war, showed that the Net Reproduction Rate was too low to maintain the population and that while the totals would increase with a declining death rate, it meant that the population was really a dwindling resource. The war has disturbed the basis of calculations, but even if birth-rate conditions revert to the pre-war position so that the numbers of workers decline, there is a margin which can be drawn on to ease the expected decline, namely, a reduction in emigration abroad or to England. So for this century, at any rate, Scotland has in her population a resource sufficient to meet the labour demands of utilising her natural resources.

Paper read before Section E of the British Association, Edinburgh, 1951.

THE ABERDEEN UNIVERSITY EXPEDITION TO CYRENAICA, 1951. PART I.

By W. B. FISHER

AT the inspiration of the then Lord Rector, Lord Tweedsmuir, and with the active support of Principal T. M. Taylor, the idea of an Aberdeen University Expedition abroad took shape during 1950-51. Foreign Office interest, and most generous financial backing from the University Court and the Carnegie Trust, made the proposals a reality ; hence on September 16th, 1951, eleven graduate and student members of the University assembled in London for the first stage of a journey to Benghazi, Cyrenaica, by Foreign Office charter aeroplane. The main basis of the Expedition was geographical, but representatives of the Botany, Classics, and Natural History Departments also took part. Besides Dr K. Walton (Geography) and Dr C. H. Gimingham (Botany), the student members were R. Dow, I. R. Fraser, J. E. Fraser, M. T. H. Hamilton, J. R. Masson, I. Matthew, G. W. J. Mortimer, I. A. Robertson and D. W. Ross, with Dr W. B. Fisher as leader. General direction of the Expedition was in the hands of a Senatus Committee, presided over by the Principal, and it was laid down that, in addition to field survey of various kinds, the venture should emphasise, independently of any scientific results, the broader objective of giving each member as wide an acquaintance as possible with conditions and ways of life in the country.

Having reached Cyrenaica by air on September 18th, the party spent a few days in Benghazi, assembling stores and transport, and also in overcoming the suddenness of the transition in two days from the rigours of a North Eastern Scottish summer to a Middle Eastern autumn. There followed a move by road to Derna, where the next five days were spent in a survey of land utilisation, and in an ecological traverse of the coastal platform and lower of the two escarpments that approach closely to the sea. Detailed maps on a scale less than 1 : 100,000 are not available, so a survey of flora and fauna, with surveyed levels, was carried from the coast to a height of 700 feet inland. Some interesting correlations were observed reflecting the rapid change from coastal lowland to interior plateau. On leaving Derna, a camp was pitched in the necropolis of the ancient city of Cyrene, classical ground to geographers as the birthplace of Eratosthenes, and here a week was spent in tracing the systems of water supply to the Graeco-Roman city, and in mapping the tomb-sites, aqueducts, tanks and catchments that occurred in the vicinity. In this work we were fortunate in having the advice and assistance of the Director and Deputy-Director of the Department of Antiquities.

At the close of the first fortnight the Expedition returned to Benghazi via Barce, in order to assemble a convoy of eight vehicles that was to escort us to Jalo, an oasis in the southern desert. Besides providing mine-detecting equipment—it is apposite to recall that some 500 persons have been killed in Cyrenaica since the end of the war by explosions—water-testing, wireless and other aids were made available by the kindness of the Army authorities. The journey to Jalo took rather longer than was anticipated, mainly because of difficulties in driving over loose sand. Night stops were made in the desert and at Aujila, after which the University party was accommodated in the Government fort at Jalo—once an Italian post, but now the headquarters of local government and also housing an Arab meteorological station maintained from R.A.F., El Adem.

In the Jalo district, varied activities took place : a survey of agricultural methods and crops ; mapping of the surface features—no small-scale map exists, of the distribution of wells, and of the water-table ; anthropometric surveys on schoolchildren and as many of the male population as proved obliging ; botanical investigation of the date-palms and other flora ; and the obtaining of data on systems of land tenure, wages, and general economy.

A rapid journey of 14 hours across the desert brought the party back to Benghazi, where stores were returned and preparations made for the return flight. Owing to a phenomenally severe sandstorm, the homeward journey came to include unscheduled stops at Malta and Nice. Aberdeen was reached on October 20th, after an absence of some five weeks.

Climatic Features

A visit in the early autumn gave some experience of the abrupt change-over from summer to winter conditions which is a marked feature of Cyrenaica. On arrival, the Etesian Northerlies, bringing Aegean air, were still dominant ; but during our stay there was displacement by a westerly air stream of lower temperature and higher humidity. A characteristic of this latter air was the formation of small-scale, transient depressions that on several occasions drew very warm, dry air currents from the desert, and gave rise to dust-storms of varying intensity. A sign of the juxtaposition of differing air-masses was the remarkable development of cumulo-nimbus cloud over the northern highlands, culminating on one occasion in a heavy but strongly localised downpour near Derna that filled the dry river bed to a depth of seven feet.

Other points of interest observed were the effects of altitude on humidity, and the extent to which air conditions varied within the southern desert area. It was noteworthy that at Benghazi and Derna the diurnal range of temperature was small, and the relative humidity unpleasantly high, especially in the latter town, which is backed by imposing scarps on its inland side. On the plateau at an altitude of almost 2000 feet, nights were cooler and the humidity markedly lower—a feature indicating that atmospheric moisture is concentrated at low levels near the coast. Conditions in the desert, even 200 miles from

the sea, were surprisingly variable. On one occasion a shade temperature of 106° F. and a relative humidity of 9·5 per cent. were recorded, whilst on another day, humidity reached 85 per cent. Night minima varied from 55° to 78° F.

Geomorphology

The route traversed, with its imposing fault-scarps in the north, and its features of arid erosion in the south—playas, baltets, pediments, outwash plains, and shifting sand layers—provided considerable variety in conditions. With restricted time, however, merely limited observations could be made, and only a few points are mentioned here.

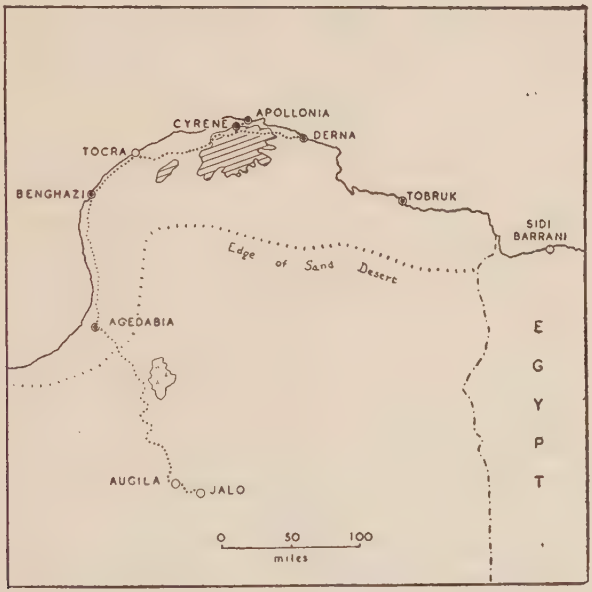

Fig. 1. Cyrenaica. Route of the Aberdeen University Expedition.

One problem is the relationship in time between the strongly marked features of water-erosion in the north, and the prevalent overlying indications of wind sculpture that indicate a drier phase of climate. The extent and importance of features due to aerial erosion point to a long-continued arid cycle and, therefore, tend to offer evidence of the broadly unchanged nature of climate within the last few millennia.

One other matter is the possibility of an extension of a sea gulf or strait from the Mediterranean west of Alexandria through the depressions of the Qattara and Siwa—which are to-day below sea-level—as far as Jarabub, Jalo, and the Gulf of Sirte. Certainly, as far as our observation went, it would seem unlikely that such a condition existed in geologically recent times, since the land platform adjacent to the Gulf of Sirte is of imposing height, and in surface structure and rock character shows little evidence of recent emergence from the sea.

The mechanics of the sand dunes of the desert were also of interest. There is a steady encroachment on gardens, houses, and well-heads in certain parts of the oases, under the influence of the prevailing north-westerly winds. Variation in chemical consistency of the dune sands, leading to consolidation in some districts, and to the development of false bedding, was also a prominent feature.

Archaeology

Reference may next be made to the remarkable archaeological interest of much of northern Cyrenaica, particularly in the Cyrene area, where the ancient city still survives in a remarkable state of preservation. Pre-1939 Italian activity had centred on the problems of cultural affinities, with special reference to the fine arts, and emphasis on the Roman period. Because of this, a great deal of the economic and geographical background has so far remained undeveloped, and there is an excellent field, virtually untouched, for the present-day worker.

At the suggestion of the Director of Antiquities, the Aberdeen Expedition attempted a map on the scale of 1 : 1200 of a portion of the vast burial area which adjoins the city, and for which no detailed plan exists. Intermingled in a remarkable way with the numerous remains of public and private tombs, sarcophagi, monumental avenues, and boundary marks are water catchments, aqueducts, foggaras, and plaster-lined water tanks. Two matters were of especial interest : the first being the contrast in styles of tomb building, ranging from the primitive step-tomb strongly reminiscent of Semitic pyramids to the straight-walled constructions of purely Classical Graeco-Roman design. The second point was the remarkable blend of Semitic and Graeco-Roman traditions : above ground most monuments showed an outward affinity to Greece and Rome, but on closer inspection it was apparent that the monuments and sculptures owed little to a vigorous indigenous tradition, being in fact close copies of originals from the northern shores of the Mediterranean. Moreover, the general evidence of a widespread cult of the dead—shown particularly by the construction of immense underground burial chambers, often beneath a monument of strictly Classical design—would appear to indicate a strong affinity with Egyptian practice. To the writer, Cyrene showed some resemblances to Palmyra, where Graeco-Roman influence seems to have been brought in, as it were rather artificially, without discrimination or complete feeling, to a people of alien culture. In Cyrene, indigenous tradition was less strong than in Syria, and so the clash is less apparent, though none the less real.

Having perhaps rashly entered non-geographical preserves, a topic more specifically connected with the environment may next be mentioned—that of the climatic conditions of the Cyrene district in historic time. Space forbids a detailed discussion of the evidence examined, but a preliminary view is that climatic conditions do not seem to have undergone marked change during the last two thousand years. This opinion is based on (*a*) the considerable preoccupation

of the former inhabitants with water conservation and catchment, shown by the multiplicity of conduits and skilfully engineered foggaras extending over many miles, (*b*) the presence of substantial stone covers above water storage tanks, suggesting a rapid rate of evaporation, (*c*) the careful siting of the city in relation to springs, and (*d*), less certainly, the fact that at the present time the ancient springs still fill public basins and fountains—following restoration by the Italians—to the original level. All this occurs, moreover, in a region where the present-day rainfall is 500 mm. (20 inches). A week's stay was not

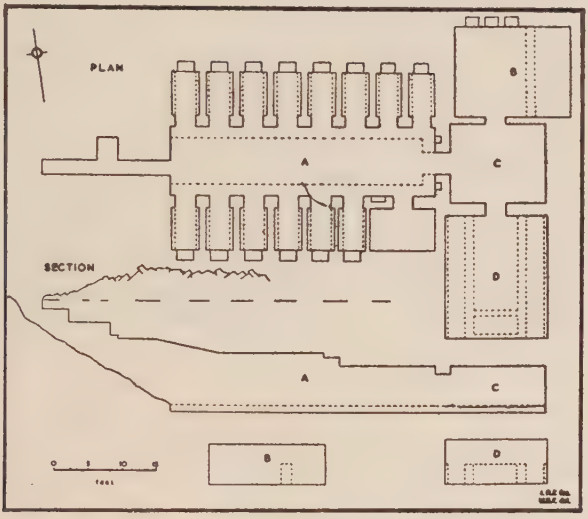

Fig. 2. Diagram of large communal tomb in the Necropolis at Cyrene, probably of late Roman or Byzantine age. Above ground are considerable remains of masonry, now in ruins, indicating a public monument in true Classical style: pillars, portico, and a surrounding walled courtyard. Below: with access only by a narrow tunnel driven by robbers above a former stairway (now blocked), are systems of tomb-chambers cut in the solid rock, without any built walls or divisions except the low walls shown as dotted lines on the plans (lower series). Each chamber, and the far doorway, has a votive niche, and the chambers also have longitudinal niches of considerable size.

A = main burial vault. B = chamber thought to have been used for religious and votive purposes. C = communicating passage (now covered in rubble). D = temporary burial chamber.

sufficient even to touch the fringe of the problems of this fascinating area, and perhaps at a later date further work will be possible.

The Southern Oases

Our visit to Aujila and Jalo allowed the possibility of fairly general investigation of a district not often visited, and of great interest from many points of view. The chief fact is of course the presence some 15 to 20 feet below the surface of a water-table which is tapped by man, and also by mature date-palms that survive without irrigation. The water is saline, though much less so than the water of Jarabub and

Siwa (Egypt) to the east ; and this fact, together with the absence of free gaseous nitrogen in the water—which is a prominent feature in the latter oases—suggests that both the area of catchment and the character of the water-bearing rocks are entirely different from those of the Jarabub and Siwa regions. Most likely the water at Jalo and Aujila is held in Tertiary strata that rise in anticlines ; and the origin of the water is either the main Jebel Akhdar to the north, or the playas along its southern edge. Some 60 wells were charted within El Erg, which is the main settlement of the Jalo oasis area. El Erg contains some 1000 inhabitants, and smaller settlements are grouped round wells up to 50 kilometres away.

Jalo lies on a trackway leading from the Mediterranean coast through Kufra and the Tibesti to French Equatorial Africa. For many centuries there has been some caravan activity—now carried on by motor lorry once per two months—but with the ending of the slave trade, which was a principal element, the importance of the trade route has greatly declined. Slaves were apparently last sold in Jalo itself in 1934 or 1936, and there are many reminders of this, in the physical appearance of many villagers, and in forms of land tenure and occupancy, under which certain persons have a reduced status little different from that of serfs. Anthropological observation, excluding three cases of what seemed to be cranial deformation, gave cephalic indices ranging from 68 to 78, with an average of 72. Besides the negroid and Semitic strains, Berberine traces occurred, and Berberine dialects are currently spoken, instead of Arabic, in the Aujila district.

Main interest for most of the Expedition lay in the land utilisation, which will be the subject of a longer note by Dr K. Walton, who conducted an investigation in detail.

Flora and Fauna

Though the Expedition was primarily geographical, our botanist and zoologist were most active, the former a little handicapped by the timing of our visit at the end of the plant resting season, when growth was at a minimum for the year. Nevertheless, a considerable collection of specimens was brought back, including one entirely new species and several new sub-species. The zoologist limited his main activities to the study of grasshoppers and locusts ; and some of his collection, also containing one or two new species, have interested the Anti-Locust Survey in Africa, and have been retained at the British Museum (Natural History).

Organisation

It is with much pleasure and gratitude that we recall details of the assistance generously afforded in many quarters. The interest of H.M. Foreign Office allowed the use of a charter aeroplane, which was especially valuable since there is no direct road or sea communication with Cyrenaica. Then, in travelling by air, almost all equipment

CYRENE: THE TEMPLE OF APOLLO (Centre)—PUBLIC BATHS WITH HYPOCAUST (Foreground)

THE SCRUB-FOREST OF THE JEBEL AKHDAR

THE BENGHAZI AREA, SHOWING THE CHARACTERISTIC LAGOON COAST AND THE HALOPHYTIC VEGETATION

JALO OASIS: THE MAIN SQUARE, WITH THE METEOROLOGICAL STATION

other than that of first aid, surveying and collection and preservation of specimens, had to be supplied within Cyrenaica ; and here the opportunity is taken of acknowledging the great help received from the Army District Commander, Brigadier Reed, C.B.E., and his staff : in particular, Major Wilson and Captain Barker of H.Q., and Captain Ware and Lt. Lindsay-Watson, who accompanied us to Jalo. It was due to two Scots sectional commanders that the army exercise, specially arranged for our benefit, was named " Exercise Marischal." All members of our party recall with admiration the skilled driving of a 19-year-old Border Scot, Driver Douglas, R.A.S.C.

The good offices of Mr Kirkpatrick, Chief Adviser to the Minister of Education, and of Mr Johns and Mr Makhouli, Director and Deputy-Director of the Department of Antiquities, and of Mr Tower, Chamberlain to H.M. King Idris, contributed much to the Expedition in obtaining local contacts and specific advice on problems. Our members also had the privilege of a reception by the Prime Minister, when a personal message from the Principal of Aberdeen University was presented. Later, the party was commanded to attend the Royal Palace, to be received by King Idris, who, after asking of the experiences in Jalo, was kind enough to express his good wishes for the success of the Expedition, and invite a return at a later date.

Value of the Expedition

It is difficult, and perhaps invidious, to attempt an assessment of the complete results of the Expedition. Unlike many similar University ventures, which often tend to consist of a small number of specialists, the Aberdeen party were in the main non-specialists, and the value from a first visit to Africa lay in the personal experience gained, as well as in the achievement of any scientific results. The generous terms of reference laid down by the University Court ensured that a relatively large number of students took part, and advantage was taken of this to carry out team projects not possible with a small group. Then, too, it could be suggested, the geographical basis of the Expedition provided a background for the linking of the other subjects—archaeology, botany, and zoology—in a broader ecological study. It is for others to judge the importance of our published results, but of the personal effects on those who took part there can be no doubt.

THE FLOOR OF THE BRITISH SEAS

By A. H. W. Robinson

Within the last twenty years, a considerable amount of information relating to the submarine morphology of the continental shelf around our islands has been forthcoming from hydrographic and, to a lesser extent, geophysical surveys. This has been made possible by the development of new techniques and the adaptation of others to meet the special requirements of marine investigation. The recent advances have partially fulfilled the objective stated by Mackinder when, writing half a century ago, he asserted that " Innumerable soundings taken and recorded with extreme care, and some method of investigating the superficial geology of the sea bed, will be needed for a sure solution of such problems." [1]

The present paper is an attempt to take stock of the ever-increasing information, and in the light of it to reassess the significance and origin of some of the fundamental features of the British Seas.

Recent Advances in Marine Survey

The greatest single factor which has contributed to furthering our knowledge of the submarine morphology is undoubtedly the development of sonic sounding. Although experiments using sound waves were undertaken by Behm in Germany as early as 1912, it was not until 1930 that an instrument was made which proved sufficiently reliable to replace the lead line in all branches of hydrographic surveying. The principle on which Behm worked is still followed at the present time, and consists of transmitting a sound wave which travels to the sea bed where it is reflected, the echo being picked up on a receiver. The time difference between transmission and reception is measured electrically, and knowing the velocity of sound in sea water (approximately 4900 feet per second), the distance travelled to and from the bottom can be obtained. It is then a simple matter to calculate the depth, taking into account the relative positions of the receiver and transmitter and their relation to the sea surface. The measurements and calculations are all carried out instrumentally, the depth being recorded by the movement of a stylus across a sensitised paper. From this ' echo trace,' the actual depths which appear on the surveyor's Fair Sheet, i.e., the record copy of the survey, and ultimately on the navigational chart, can be read off by means of a graduated scale.

The use of the sonic sounding apparatus has enabled a continuous profile of the sea floor to be obtained in place of the series of isolated ' spot depths ' of the lead line method and, provided that the sounding lines are run sufficiently close together, a very thorough examination

of the submarine relief is possible. Moreover, as the machine is run continuously as the ship is under way, the speed of the survey, and hence the area covered in a given time, is considerably increased. Whereas 25 miles of sounding in a 10-hour day was considered a good output with the old lead-sounding machine, this rate can be doubled using a sonic sounder.

Sonic sounding is not without its difficulties. Occasionally a shoal of fish may intercept the sound wave, thus giving a wrong value for

Fig. 1. The British Seas.

the depth of the sea floor if not correctly interpreted as a ' false echo.' Another difficulty arises where the sea bed is uneven, e.g. where it is crossed by a deep valley cleft. In sounding across such a feature, echoes may be received from the two sides simultaneously, giving a confused echo trace which is almost impossible to analyse. In spite of these and other minor defects, sonic sounding remains far superior to the older methods which it replaced.

Depth determination is valueless in itself unless the position of the ends of the echo trace can be accurately fixed. Within sight of land, this is a relatively simple matter, but further offshore and especially

towards the margin of the continental shelf, accurate position-fixing presents a considerable problem. Although a full discussion is beyond the scope of the present paper, it may be remarked that in recent years some progress has been made towards overcoming the difficulty with the introduction of :

(1) Taut Wire apparatus, consisting of piano wire unwound from a revolving drum to give a measure of the horizontal distance travelled from some fixed object.
(2) Radar, to run sounding lines following the arc of a circle at a constant distance from a prominent object which can be clearly identified on the radar screen. A survey carried out on these lines was made in 1946 of the sea bed in the northern approaches to the Irish Sea between Islay and Inishtrahull.
(3) The Decca Navigator, a radio aid which, although primarily designed to assist general navigation, will, under favourable circumstances, give a fix to within 10 metres, an accuracy which compares well with the other methods commonly used in hydrographic survey when out of sight of land.[2]

The increasing knowledge of the submarine relief which has resulted from the detailed hydrographic surveys has had its parallel in investigations into the geology of the sea bed over limited areas within the continental shelf. An early lead was given by Charcot and Dangeard in the English Channel and continental shelf area off Ireland during the years 1923 to 1927.[3] Using a bottom dredge, many rock samples were brought to the surface, some of which were interpreted as representing rock *in situ*. This is a field in which much work remains to be done, possibly using such devices as the new core sampler of Kullenberg, used in the Western Mediterranean[4]; the core sampler of Pratje, first tested in the North Sea in 1949[5]; and the modified form of Stetson core sampler used by King in the English Channel.[6]

Gravimetric and seismic evidence have also helped in elucidating some of the problems of the underlying structure of the sea floor. The pioneer work of Vening Meinesz in the Dutch East Indies (1926) and the Caribbean (1928-37), using a submarine for gravity measurements, prompted similar investigations in the English Channel and off the western seaboard, in 1938 and 1946.[7] Seismic investigations, involving the detonation of a charge and the measurement of the velocity of the resulting sound waves by means of hydrophones arranged at some distance from the centre of the explosion, have been undertaken in the approaches to the English Channel by Bullard and Gaskell in 1938.[8] Although important deductions regarding the depth of the relatively uncompacted sediments overlying the crystalline basement rocks have resulted from these observations, further work is needed before the detailed structure can be fully understood.

With these considerations in mind, attention can now be focussed on the submarine morphology of those parts of the British Seas where recent investigations have been made.

The Celtic Sea

This area at the western approaches to the English Channel and Irish Sea forms a distinctive sub-region of the continental shelf (Fig. 2). It is delimited by the continental borderland slope in the west and south-west and by the land areas with a Celtic background in both the north and south-east; for this reason the name Celtic Sea, proposed by the zoologist Holt in 1906, seems appropriate and will be adopted in the present text.

The submarine relief is characterised by a succession of banks trending north-east to south-west, the Great Sole, Cockburn, and

Fig. 2. The Celtic Sea.

Jones Bank being the most important. They show an accordance of ridge top levels at about 60 fathoms in the west, decreasing to 45 to 50 fathoms further east. The differential depth between the bank crests and the intervening hollows is of the order of 15 to 20 fathoms.

In trend the banks simulate the promontories of the ria coast of south-west Ireland and it may be postulated that they have a similar origin, resulting from the folding associated with the Armorican earth movements. After this period of mountain building, the land area extending over what is now the Celtic Sea was worn down and subsequently covered by the sea during the marine transgressions of the early Jurassic, late Cretaceous and Tertiary periods. Any deposits laid down at these times have been largely removed, the underlying Devonian and Carboniferous rocks being re-exposed. Subsequent selective marine erosion, possibly aided by sub-aerial denudation

during periods of low sea level in the Pleistocene or even earlier, has created the present uneven bottom form of the exhumed Palaeozoic surface.

Towards the south-east, the succession of banks is replaced by a more gently sloping and less dissected bottom topography. Gravity measurements taken by Browne suggest that the proven Mesozoic sedimentary basin of the English Channel extends to the westward into this area, completely covering the Palaeozoic rocks which are exposed in the sea floor toward the margin of the continental shelf. If this view is correct, it would satisfactorily account for the differing form of the sea floor in the two distinctive areas of the Celtic Sea. It may be noted, however, that the single line of seismic observations run by Bullard and Gaskell [8] across the outer margin of the continental shelf in this area, failed to differentiate between the contrasting rock types. Instead, from their results they postulate a wedge-shaped layer of sedimentary rock 8000 feet thick along the continental borderland slope, steadily decreasing eastwards till, in the vicinity of the 50 fathom contour, the plane of discontinuity intersects the sea floor ; this view of the underlying structure has not met with universal acceptance.

The existence of submarine 'canyons' serrating the continental slope bordering the Celtic Sea has long been suspected from the sporadic sounding data available for the area. It is only within the last three years, however, that these speculations have been confirmed by hydrographic surveys. In February 1949, H.M. Surveying Ship *Dalrymple* examined the sea floor in the vicinity of Little Sole Bank (48° 20′ N, 9° W), a survey which disclosed three distinct furrows running from north to south and two aligned from east to west (Fig. 3). In 1951, H.M. Surveying Ship *Cook* found another east-west furrow in latitude 50° 30′ N, and later in the same year a single line of soundings run on passage along the line of the continental slope from Cape Finisterre to Little Sole Bank disclosed a series of deep ' valleys ' the sides of which were as steep as 15° in places.

It is not within the scope of the present paper to examine the many possible hypotheses which have been advanced to account for these distinctive elements of the submarine morphology ; excellent summaries of current views on the problems involved, have been given in recent text-books on submarine geology.[9] Some specific points of interest connected with the 'canyons' discovered in the vicinity of Little Sole Bank, however, can be considered. The furrows are aligned at right angles to the direction of the continental shelf margin, which at this point makes a right angle bend. They lie in close juxtaposition to one another, 'canyons' 3, 4 and 5 being less than 5 miles apart. There is also no regularity in the depth of the canyon heads, nos. 1, 3, 4 and 5 having cut into the continental slope up to approximately the 100 fathom line whilst the smaller 'canyon' no. 2 makes no incision above the 500 fathom line. Similarly the 'canyon' floors extend to different depths, dropping to over 2000 fathoms in the combined lower portions of nos. 3 and 4.

These facts taken together would seem, in the opinion of the author, to favour the hypothesis of formation by turbidity currents rather than

by sub-aerial river erosion. The turbidity currents would tend to flow down the line of greatest slope, thus acquiring a maximum velocity and hence, maximum erosive power. The close spacing of the furrows makes it unlikely that they have been etched out by five separate rivers, although admittedly they could represent the delta distributaries of a single river which formerly crossed the Celtic Sea.

The existence of possible turbidity currents moving down the

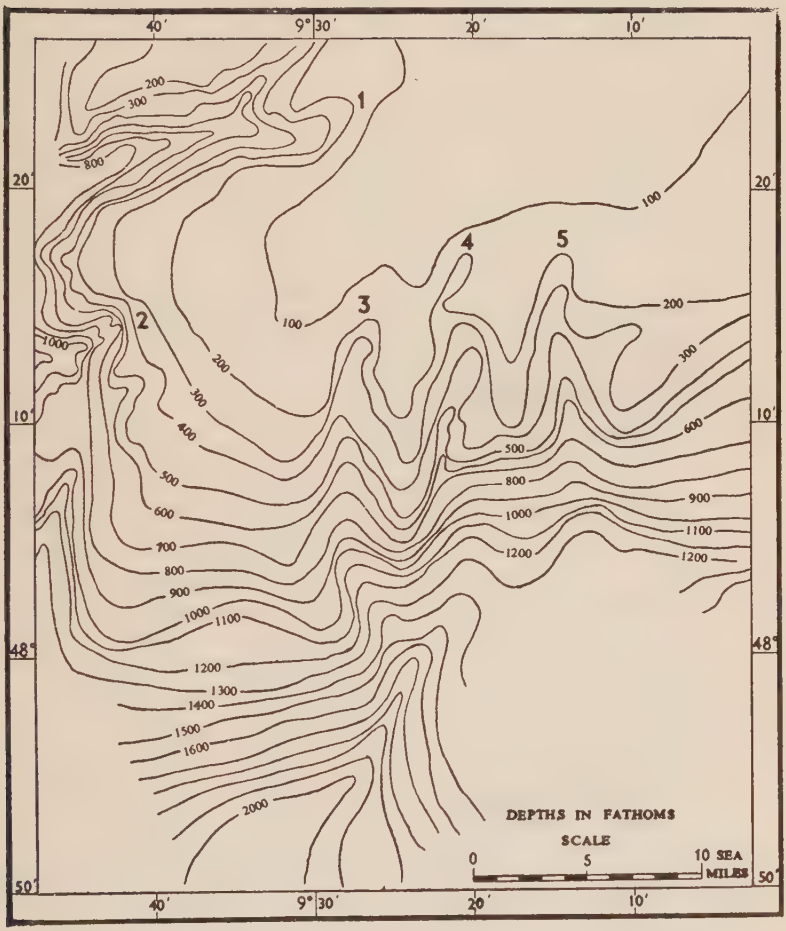

Fig. 3. Submarine ' canyons ' in the vicinity of the Little Sole Bank.

continental borderland slope in this area has recently been shown by Cooper.[10] He visualises a process whereby distinctive water masses, each with its own marked characteristics of salinity and temperature, etc., cascade down the slope ; these may be responsible, at least in part, for the etching of the furrows to great depths.

The evidence of the longitudinal profiles also does not lend strong support to the sub-aerial excavation hypothesis. Reference to Fig. 4 shows that the profiles of the four major canyons are broadly similar

in outline, tending to be concave upwards near their head but concave downwards throughout the greater part of their length down to 1500 fathoms. The curves, therefore, do not simulate a normal river thalweg except possibly in their upper part between 100 and 350 fathoms. It is conceivable that the excavation of this upper stretch

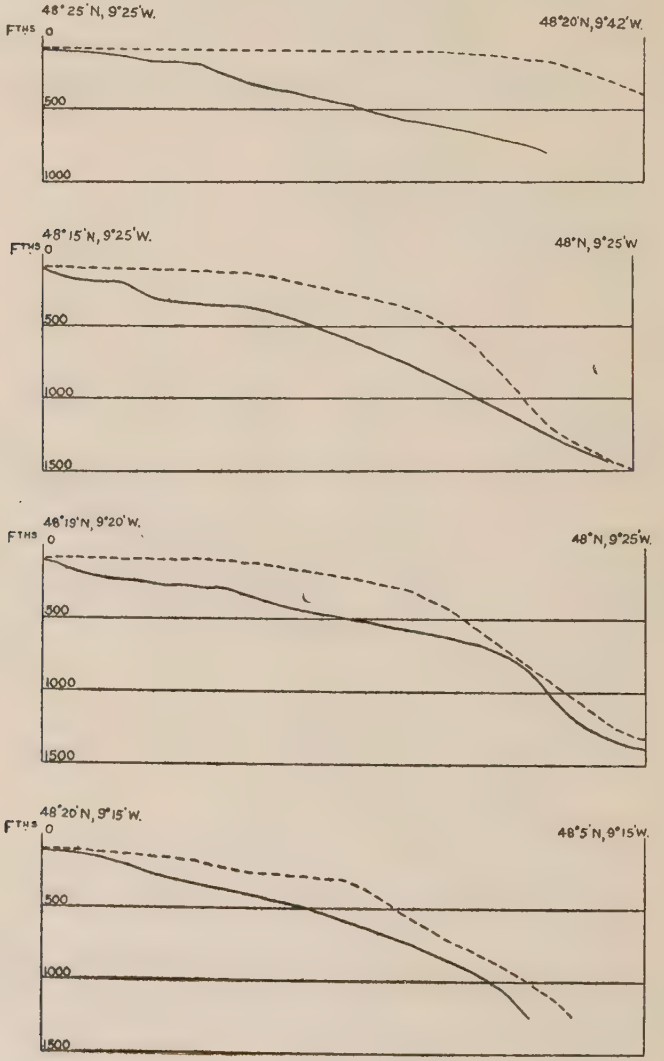

Fig. 4. Longitudinal profiles of the four major 'canyons'. The profile of the adjacent part of the Continental Shelf is shown by the broken line.

was accomplished by sub-aerial forces during periods of low sea level during the Pleistocene epoch or at an even earlier date. The initial furrows would serve to localise turbidity currents brought into play by a subsequent rise of sea level; these would then excavate the lower sections of the 'canyons'. This possibility of a composite origin is

unlikely to have occurred, however, for it would still require a lowering of sea level of 2000 feet to allow even limited sub-aerial erosion.

The Outer Banks

Lying off the west and north-west coast of Ireland are the outer banks—Porcupine, Rockall, Rosemary, Bill Bailey, Lousy, etc.—which although, *sensu stricto*, falling outside the continental shelf as delimited by the 100 fathom line, can nevertheless be considered as morphological elements of the British Seas (Fig. 1). In form, the banks are typically steep-sided and flat-topped, resembling the sea-mounts of the Pacific and South Atlantic oceans. In the case of the Porcupine and Rockall, the banks are elongated in a NE-SW direction, whereas the Rosemary, George Bligh and Faeroe Banks are essentially circular in plan. The average depth of their flat tops varies from almost 100 fathoms in the case of the Porcupine to 60-70 fathoms on Rockall Bank, although in one place the latter projects above the surface to form an isolated rock, 70 feet high and 80 feet across.* Further north, the George Bligh and Rosemary Banks are much deeper, the average depth of their tops being about 270 fathoms. Towards the Faeroes the banks become shallower, Lousy Bank having an extensive area under 150 fathoms, whilst on the Faeroe Bank the average bottom depth is only 50 fathoms. This absence of uniformity of depth of submergence of the bank tops suggests that their flat tops are not due to wave abrasion but, rather, are conditioned by structure.

This conclusion is borne out by the numerous rock fragments which have been dredged from the banks in recent years. These show that all the banks belong to the North Atlantic Thulean igneous province, the effects of which can be clearly seen on land in the Tertiary basalts of Antrim, Mull, Skye, the Faeroes, Iceland, etc., and their associated igneous intrusions. An extensive programme of bottom dredging undertaken by Charcot in 1921-27 showed that basalt is the predominant rock type forming the banks.[3] Over Porcupine Bank, angular basalt fragments were brought to the surface, but it is not known whether these have been brought to their present situation by ice from further north. Cole, in an earlier investigation,[11] found that 80 per cent. of the bottom specimens obtained consist of olivine gabbro. From the evidence of chemical analysis, he was inclined to think of the bank being formed largely of this rock type, intruded from the same magma which further north appears in the form of the extrusive basalt. The researches of Charcot leave no doubt that Rockall Bank is essentially a submerged basalt plateau, for 95 per cent. of the dredged rock fragments consist of this type of rock. Rockall itself, on the other hand, is formed of a granite porphyry to which the name 'rockallite' has been given. This may well represent a local granitic intrusion, similar to those associated with the basalt plateau lavas in Mull and Skye.

In the banks further north, the rock type forming the sea floor is less easy to determine, for there is an extensive covering of glacial deposits. The specimens obtained in 1921 by the *George Bligh* from the

Fig. 5. The Wyville Thomson Ridge and the adjacent banks.

Lousy Bank form a varied assemblage of quartzite, arkose, gneiss, etc., and were probably brought to their present situation by ice moving from West Scotland and Northern Ireland.[12] They form a thin veneer overlying the succession of basalt flows which give rise to the flat top of this and other banks in the area. At the edge of an individual flow, a submarine escarpment is often present, the most continuous scarp lying to the north-west of the Faeroes where it has been traced by sonic sounding for a distance of 20 miles. The basalt flow is also responsible for the remarkable uniformity of depth which is found over large areas. An echo trace run for 30 miles due south of the Faeroes showed that the depth increased at the rate of less than 5 feet per mile, equivalent to an average gradient of 1 : 1000.

Joining the Faeroe Bank with the continental shelf proper is the elongated Wyville Thomson Ridge. The existence of this submarine barrier was first inferred after the cruise of H.M.S. *Porcupine* in 1869 had disclosed a remarkable difference of 14° in the minimum temperature recorded in the Faeroe Channel compared with that found to the south-west. No opportunity afforded itself of verifying this by sounding until 1882, when Tizard in the *Knight Errant* and *Triton* carried out an extensive survey and delineated the submarine sill for the first time.

Recent investigations (1941-43), using sonic sounding methods, have supplied new details of the submarine topography in this area (Fig. 5). The Faeroe Channel is now known to extend to the north-west and to completely sever the Faeroe Bank from the shelf around the Faeroes. There is, in fact, no continuous submarine ridge connection between Scotland and the Faeroes, the supposed land bridge—as shown on the map in Mackinder's *Britain and the British Seas*—being only a myth.

The uneven form of the Wyville Thomson Ridge, in contrast to the flat tops of the adjacent banks, suggests that it had a different origin. This is confirmed by the many bottom dredgings made over the ridge, which show that it is composed of a mixed assemblage of sub-angular fragments embedded in a sandy boulder clay. The fragments include types found *in situ* in the Orkney Islands (Caithness Flagstone), south Shetland (Brenista Flags), west Scotland (Cambrian Quartzite).[13] These rocks have been brought to their present situation by ice which moved northward from Scotland to join with the Scandinavian ice. The ridge, then, is an end moraine formed along the margin of this ice sheet during a still-stand of the ice front. Whether or not it is formed entirely of morainic material, for it lies 2000 feet above the level of the surrounding sea floor, cannot be determined. There is a possibility that a submarine ridge formed of volcanic outpourings existed in pre-glacial time and on this the ice sheet grounded as it moved westward.

The North Sea Basin

One of the most outstanding elements of the British Seas is undoubtedly the deep sinus of the Norwegian Trench, which penetrates

the margin of the continental shelf for a distance of 550 miles (Fig. 1). The feature was considered by Jukes Brown to be the drowned lower section of a great Baltic river, but the fact that its deepest part is near its head (423 fathoms off Arendal) and not near its mouth (it is less than 200 fathoms off Bergen) makes such an origin unlikely (Fig. 6). Moreover, this theory does not take into account the remarkable parallelism between the trench and the coast of South Norway,[14] a fact which led Holtedahl, in a recent contribution,[15] to suggest a tectonic origin. Holtedahl thinks of the trench as originating through the tilting of the Scandinavian block to the east and north-east in early Tertiary time. Movement along the sides of the trench is still taking place, as is apparent from the earthquake shock, with epicentre in 59° N, 5° E, recorded in January 1927. The present form, with a relatively flat floor, steep sides and inner overdeepened basins, reflects

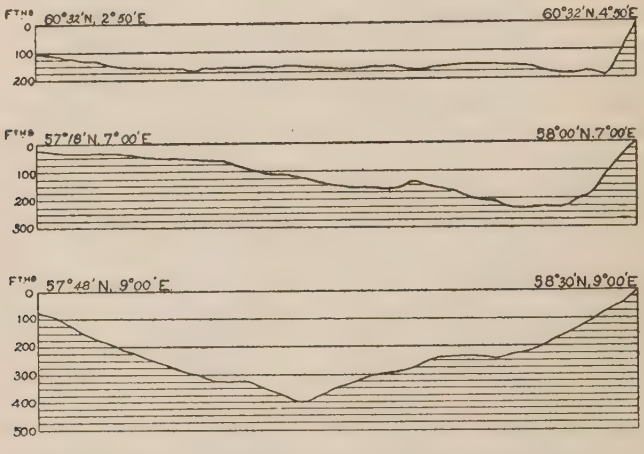

Fig. 6. Transverse profiles across the Norwegian Trench.

the modification of the original tectonic feature by ice during the Pleistocene epoch. A recent survey (1950) by the German survey ship *Gauss* in the area of the trench which falls within the Skagerrak, has disclosed the existence of a double trench feature, the inner trough having arisen through a secondary line of faulting.

The remainder of the North Sea basin reflects in its topography the direct effects of the Pleistocene Ice Age. Skirting the Norwegian trench in broadly concentric rings are a series of 'stony grounds' rising above the surrounding bottom level and which, from the fact that they join up with the well-known end moraines of Jutland and the North German Plain, have been interpreted as the submarine continuation of these land features (Fig. 7). Pratje has been able to distinguish three lines of submerged end moraines formed during the later (Würm) stage of the Pleistocene epoch, as the Scandinavian ice sheet became progressively smaller.[16] Similar stony grounds occurring elsewhere in the North Sea basin possibly represent earlier stages in the northward retreat of the ice sheet, but the fact that they occur

in shallower water has meant that they have suffered subsequent deformation by marine agencies, making it impossible to establish their trend or relative dating.

During pre-glacial times and at certain periods of low sea level

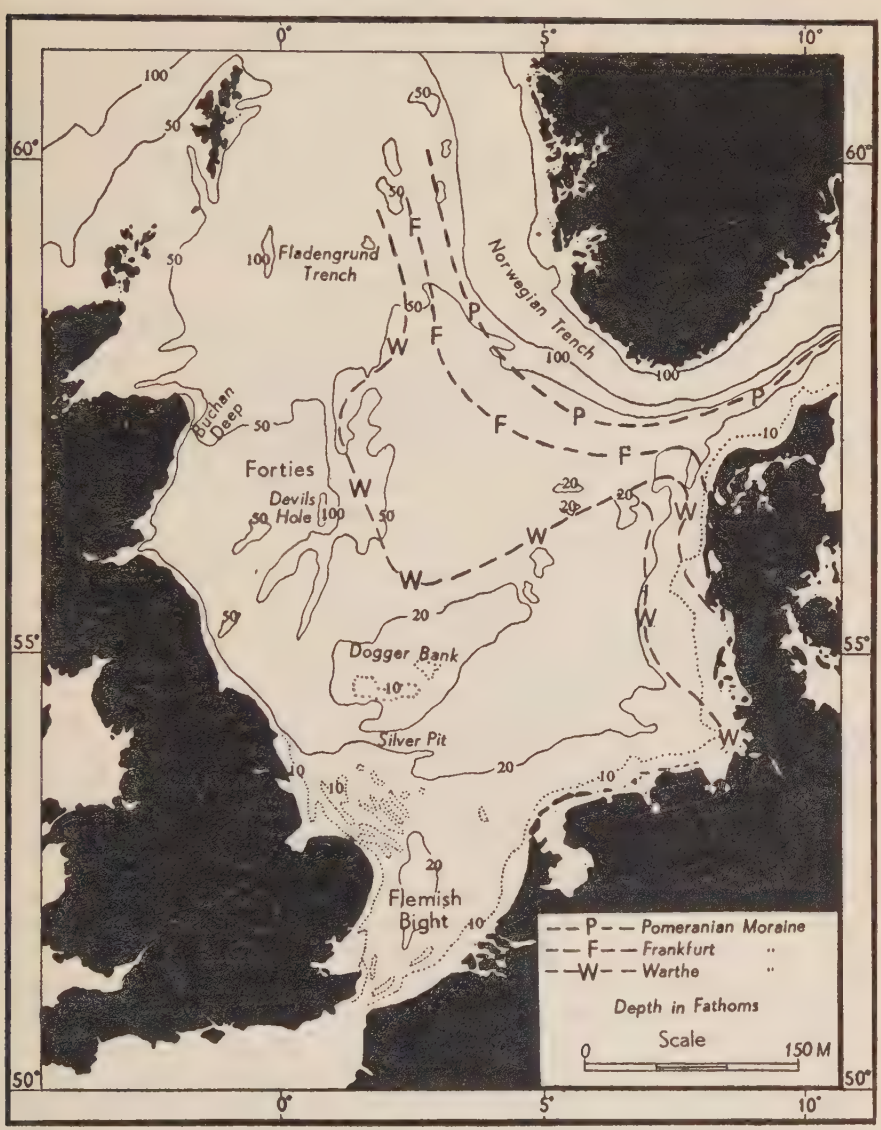

Fig. 7. Morphological features of the North Sea basin. End moraine stages, after Pratje.

in glacial times, the present North Sea basin was a land area crossed by the ancestors of rivers which now drain into it. Various authorities have suggested that the main trunk stream was formed by the proto-Thames and Rhine which joined to the south of the Dogger Bank and

flowed northward to enter the sea in the neighbourhood of the present continental shelf edge. The courses of this river, for it changed its position from time to time, have been regarded as forming the series of isolated basins in the present submarine topography. The Silver Pit, lying to the south of the Dogger Bank, differs from the remainder in that its trend is from east to west ; it may be the remains of an old urstromtal channel formed when the ice front lay in the vicinity of the Dogger Bank. Devil's Hole, with a maximum depth of 130 fathoms compared with 40 fathoms in the adjacent Forties, although well known to fishermen for many years previously, was first accurately surveyed in 1930.[17] More recently (1950), the *Gauss* has discovered a similar deep, elongated cleft, 25 miles in length and up to 150 fathoms depth, lying 80 miles to the east of the Orkneys. This has been named Fladengrund, after the adjacent fishing bank.[18]

The origin of these holes is difficult to explain, for if they represent remnants of a former river course, as has been suggested above, their apparent isolation must be taken into account. R. G. Lewis considered that they were formed as overflow channels across rising anticlines, structures which no longer appear in the present sea floor.[19] The evidence which he instances of the existence of the rising anticlines, e.g., the erosion along the Suffolk coast, is questionable. It is more probable that the isolation is due to the partial infilling of the former river valleys by glacial deposition during the later stages of the Pleistocene epoch. On this hypothesis, masses of dead ice left behind by the retreating ice sheet would prevent complete infilling and on melting, lead to the formation of the holes. Marine agencies acting subsequently have done little to modify the original form ; bottom dredging in the Devil's Hole brought to the surface only ash and cinders from ships. There is also the possibility that in the present state of knowledge the isolation of the holes is more apparent than real, for it must be remembered that large areas in the North Sea have not been systematically surveyed using sonic sounding methods ; future examination may disclose trenches similar to that found recently near the Fladengrund.

The southern part of the North Sea, in particular the Flemish Bight, is characterised by a number of elongated banks such as the Gabbard, Galloper, Tail of the Falls off the English coast, and Brown Ridge, Hinder and Fairy off the Flemish coast. The banks are formed of glacial sand and gravel re-sorted by wave and current action, and are typically hump-backed in cross section. They rise to within a few fathoms of the sea surface and rest on a relatively flat floor at a depth of 15 to 20 fathoms. In profile the banks are asymmetric, presenting a steep face landward and a more gentle slope seaward. Their surface is thrown into a number of waves, the amplitudes of which may be as great as 30 feet and wave length up to 200 feet.[20] The alignment of the wave crests follows the main axis of the banks and parallels the dominant direction of the flood and ebb tidal streams. This suggests that the streams have played a prominent part in their formation, although the crests must suffer considerable deformation by wind waves especially during storm periods.

The English Channel

Unlike that of the North Sea basin, the covering of superficial deposits in the Channel is everywhere thin, and even absent over large areas. The submarine morphology, in consequence, is largely developed in the solid geological formations exposed in the sea floor. An exception is in the vicinity of the Strait of Dover where there are a number of elongated banks, e.g. the Varne, the Ridge, Vergoyer, etc., similar to those existing in the Flemish Bight (Fig. 8). Like the latter, these banks are formed of re-sorted glacial deposits that have been carried to this area by the overflow channel which drained the ice-front lake developed in the Flemish Bight during the period of maximum extension of the NW European ice sheet.

There is little observable relationship between the bottom topo-

Fig. 8. Submarine features of the English Channel.

graphy and the known or speculated disposition of the various formations exposed in the bed of the Channel. The researches of Dangeard in the *Pourquoi Pas?* from 1923 to 1927, and those of King [21] since the war, have shown that this site of the Channel was occupied by an epicontinental sea for long periods in the Mesozoic and Tertiary eras. Much of the portion to the east of the Isle of Wight has a chalk floor. To the south of Beachy Head, however, there is an extensive basin of Eocene beds, whilst between the Isle of Wight and the Cherbourg Peninsula, Triassic rocks outcrop in mid-Channel. Neither of these structural features is reflected in the form of the sea floor. The bed of the eastern Channel slopes with a constant gradient to a deep water axis, as delineated by the 30 fathom line, lying nearer to the English rather than to the French coast. This deep-water sinus has been taken to represent the course of a river which formerly drained the area prior to the recent submergence. To the westward its alignment is

continued by the Hurd Deep, an elongated trench almost 100 miles in length but seldom more than 4 miles in width, with a maximum depth of 93 fathoms in its eastern part (Fig. 9). The isolation of the deep, for there is no direct connection with the outer continental shelf, makes it difficult to accept the view that it represents the position of a former river valley. Also there is no evidence from Dangeard's bottom samples that the lower course of this hypothetical river valley has been recently filled in ; in any case, differential sedimentation would be difficult to explain. Furthermore, the asymmetrical cross-profile does not simulate that of a typical river valley unless there is a structural control. It may be that the deep is a tectonic feature of some antiquity ; clearly some further information, in particular relating to the rocks exposed in its floor and sides, is desirable before any definite conclusion regarding its origin can be reached.

Any theory which seeks to explain the present floor of the Channel in terms of a drowned land surface must advance evidence for a general eustatic lowering of sea level in relatively recent geological time. Whilst direct evidence is lacking for a drop in sea level of a magnitude which would fully uncover the whole floor, the recent

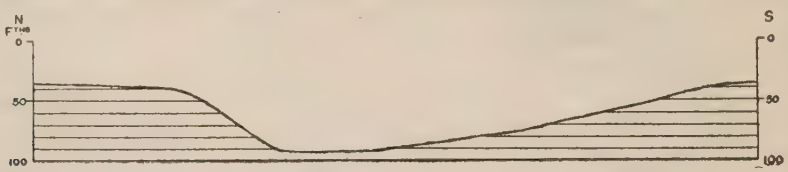

Fig. 9. Transverse section (six miles) across the Hurd Deep in longitude 2° 20′ W. Vertical exaggeration = 8.8.

discovery of a marked break of slope off Plymouth[22] indicates a former sea level about 20 fathoms lower than the present. An echo-sounding profile taken 2 miles south-south-west of Plymouth breakwater showed a submarine cliff 33 feet high with its base in 22 fathoms. Landward of the cliff the slope of the sea floor is very uneven, suggestive of a recently drowned land surface. The cliff may well represent the position of a shore-line prior to the submergence which created the drowned rias of the neighbouring coast.

Conclusion

Any analysis of the bottom morphology of the continental shelf around the British Isles must be regarded as tentative in the present state of knowledge, for although within the last twenty years new techniques of marine investigation have been developed, they remain to be fully exploited. The use of sonic sounding, for example, has been largely restricted to near-shore examinations to satisfy navigational requirements ; only in special circumstances have hydrographic surveys been undertaken in the deeper water regions. Future examination of the form of the sea bed in these outer areas, combined with the collection of data about operative marine processes, particularly sub-surface tidal stream measurements and the effective depth of wave agitation, may lead to the solution of many problems as yet unresolved.

The author is indebted to the Hydrographer of the Navy for the facilities afforded for examining the relevant hydrographic surveys of the area covered in the text. The accompanying figures have all been compiled from these documents in the Admiralty Hydrographic Department and are reproduced with the permission of the Hydrographer of the Navy and the Controller of H.M. Stationery Office. The author is also grateful to Dr P. R. Crowe, of the University of London, for suggestions on the content of the paper.

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THE NATURE CONSERVANCY IN SCOTLAND

By F. H. W. Green

Established under Royal Charter in March 1949, The Nature Conservancy is a body controlled by a Committee of the Privy Council and having certain powers under the National Parks and Access to the Countryside Act (1949). The functions, as stated in the Charter, are " to provide scientific advice on the conservation and control of the natural flora and fauna of Great Britain ; to establish, maintain, and manage nature reserves in Great Britain, including the maintenance of physical features of scientific interest ; and to organise and develop the research and scientific services related thereto." In Scotland, the activities of the Conservancy are centred at 12 Hope Terrace, Edinburgh, 9.

On 23rd November 1951 an area of some 10,000 acres in Kinlochewe Forest, which had been acquired by private treaty, was formally declared a Nature Reserve by the Conservancy. This first nationally owned Nature Reserve includes the eastern slopes of Beinn Eighe down to the Torridon road and the road by Loch Maree. The wide altitudinal range, from 37 feet to over 3200 feet, and the variety of habitats, make the Reserve particularly valuable for biological study in relation to nature conservation. The woods, notably Coille na Glas-leitire by Loch Maree, are predominantly of Scots pine and birch, and merge upwards into moorlands with pools and lochans, above which are screes and steep rocks. The geological features of the Reserve are of considerable interest, and the Cambrian quartzite on the Torridonian sandstone is responsible for the impressive scenery in the western part. The exposed ridges and the high corries provide habitats for several species of arctic-alpine plants including the alpine bearberry, the purple saxifrage and mountain azalea. The mammalian fauna of the Reserve includes red deer, roe deer, wild cat, and pine marten, while among the birds are the golden eagle, buzzard, the raven, the greenshank, and ptarmigan.

On 20th May 1952 there was officially declared a second Scottish National Nature Reserve at Morton Lochs, on Tentsmuir in north-east Fife. This Reserve is on raised beach covered by maritime dune sand. The area of the Reserve is entirely surrounded by Forestry Commission property which is being planted. The lochs are artificial : they were constructed for fish rearing last century, through the extensive diversion of a burn. The lochs lie on a main migration route of wildfowl and waders, and for this reason, and because there are no other sheets of fresh water for several miles, the lochs are visited by many species, including some rarely seen in other parts of the country. Besides being a resting place for wildfowl on migration, the lochs became

an interesting and important breeding ground. The Reserve is also of interest botanically and for its invertebrate fauna. In recent years, silting of the water supply and disrepair of banks have led to the drying up of the lochs in summer. Steps are being taken to restore the lochs with an adequate controlled water supply. The controlled raising and lowering of the water table in the varying types of low land surrounding the lochs will provide data for assessing the importance of this factor.

Access to this small area will necessarily be limited to some extent, both as regards numbers and seasons of the year, though an access road which passes through the Reserve gives a general view ; but arrangements will be made later whereby *bona fide* naturalists can obtain facilities.

In addition to the acquisition of National Nature Reserves, it is the task of the Conservancy, under both Act and Charter, to give advice, especially to local authorities, on measures to preserve features of botanical, zoological or physical interest. An ultimate aim is to be able to forecast what will be the effect on these features of either interference with present use or even continued ' non-interference.' Many misconceptions exist as to what are ' natural ' features of the Scottish scene, and surveys of Sites of Special Scientific Interest (" Section 23 Sites," referring to the Act) reveal more and more complications. The aim of listing " Section 23 Sites " is primarily to enable Local Planning Authorities to be aware of those features of scientific interest which should not be disturbed without consultation, through the Nature Conservancy, with those having the fullest knowledge of the facts. Even though such a safeguard can operate only when the provisions of the 1947 Town and Country Planning Act are brought into force, these sites will be marked on the County Development Plans for all to see upon request.

Botanical interests tend to be in the foreground in the search for remnants of primeval Scotland, and from this angle alone it cannot be over-emphasised how much the land has changed in the last few centuries. How much of the Highland ' moors ' represent natural scenery ? In fact the greater part could without exaggeration be described as a land greatly modified, in places virtually devastated, by human interference, by the felling of the extensive woodlands and the grazing of sheep. Although there may be differences of opinion as to what trees should be planted, it is erroneous for critics of the Forestry Commission to complain with false romanticism that the age-old bareness of the hills is being replaced by the arboreal intruder. The natural cover would over vast tracts be woodland, if only sheep, rabbits, and deer did not eat the young trees, which would otherwise gradually replace the forests felled during the last three centuries either for profit or during the process of ' burning out ' outlaws. The far-reaching effects of over-grazing have been discussed in several articles in this *Magazine*, but the nation as a whole is not yet nearly as aware as it should be of the clash between short-time and long-term interests : fulfilling the immediate demand for meat and wool on the one hand, and land conservation on the other.

The carrying out, and support, of research on ecological problems forms an important part of the Conservancy's activities. Mention of one problem must suffice, the question of the " disappearance of roughs." Not only do hedges, scrub, and strips of trees provide shelter, but they harbour birds, insects, and other small animals ; some of these are vermin in every sense of the word, but many of them, notably the insects, form vital links in the ecology of farm crops, and there is still room for much research here.

There are some places which, even without human interference, would be of special scientific interest for only a limited period. Nature is always changing the earth's surface, and often, as in human history, the periods of rapid change are more interesting than the slow ones. We can learn much, for instance, from changing shore-lines, and it is often of great interest, not only to geographers and botanists, to study what happens where the shore-line shows rapid accretion or erosion. But there comes a time when relative stability is reached, and ultimately when the vegetation has passed through the rapid change of the ' colonising ' period, and the area, while still interesting, has become of somewhat less immediate concern.

Of a permanent interest, by contrast, are certain important sites for the study of solid geological features. Steps have already been taken by various bodies to preserve such remarkable features as the Fossil Grove of trees in Rouken Glen, Glasgow, but new sections sometimes come to light in such activities as quarrying or road-widening operations. An excellent recent example occurs on the road from Traquair to Mountbenger (B 709), where road-widening has revealed an unusual example of ' slumped bedding ' in the Silurian greywacke. All of these are brought under one list at least as " Section 23 Sites," though some may merit the higher status of Nature Reserve.

Space does not permit the quoting of further examples of zoological, entomological, ornithological or other interest, but these are all the concern of the Conservancy. It remains finally, however, to mention the power given to local authorities under Section 21 of the Act to create Local Nature Reserves, either by purchase or by agreement with the owners. East Lothian C.C. is the pioneer in this respect, as this is the first Council in the country to announce its intention of creating a Local Nature Reserve, in this case an area of considerable, if not unique, ornithological and botanical interest at Aberlady Bay.

Photograph of Coille na Glas-leitire, by Robert M. Adam. R.A.F. photograph of Morton Lochs, Crown Copyright.

COILLE NA GLAS-LEITIRE, LOCH MAREE (FIRST SCOTTISH NATIONAL NATURE RESERVE)

REVIEWS OF BOOKS

EUROPE

The British Isles. By A. Demangeon. Translated and revised by E. D. Laborde, PH.D., F.R.G.S. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. xviii + 434. 80 figs. 56 plates. London: William Heinemann Ltd. Second edition, 1949. 21*s.*

This is a second and revised translation of Demangeon's classic work in the *Géographie Universelle.* It is welcome as being one of the few authoritative regional text-books on Britain, and Dr Laborde's style and presentation make him a worthy translator. When all this is said it is the more unfortunate that the revision is piecemeal. The chapter on London is fully up to date, but in the remainder most of the figures relate to 1931-1939, while the text is an exact translation of the original and in many places is by now very misleading. Nowhere is account taken of the revolution brought about by the development of motor transport (*e.g.* p. 298), and no mention is made of the agricultural changes which have taken place since 1939. It is also unfortunate that new and better plates could not be used, especially as this would ensure greater accuracy. It is to be hoped these and many more drawbacks will be made good in any future revision. H. P. W.

British Canals: An Illustrated History. By Charles Hadfield. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. 259. 44 text illustrations. 8 plates. 17 sketch maps. London: Phoenix House Ltd, 1950. 16*s.*

More than any other form of inland transport apart from the stage-coach, canals have appealed as a literary subject. The appeal is however usually exercised by the picturesque, the romantic and the decayed. Here on the other hand is an authoritative and lucid history of the rise and decline of our canal system, an important era in the industrial development of Britain. Original sources are carefully used and scrupulously quoted, but in addition Mr Hadfield is an enthusiast and is able to convey his enthusiasm to the reader. His book, as a result, is eminently readable in addition to being a valuable piece of scholarship. Contemporary engravings, photographs and maps lavishly illustrate the text, and the whole is a contribution to the better understanding of our economic history. H. P. W.

The Scottish Countryside in Pictures. Foreword and Introductions by F. Fraser Darling. Illustrations described by Alasdair Alpin MacGregor. $9\frac{3}{4} \times 7$. Pp. 128. Illustrated. London: Odhams Press Ltd, 1950. Reprinted, 1951. 12*s* 6*d.*

This fine series of Scottish pictures is divided into four sections: Highlands and Islands, Southern Scotland, East Scotland, and the Far North. The descriptive introductions by Dr Fraser Darling, and the informative captions by Alasdair Alpin MacGregor, give much more than a mere pictorial interest to the book. The photographs are generally excellent, and many are of high artistic quality. An excellent gift-book for visitors or for friends of Scotland overseas. I. W. H.

Glossary of the most common Gaelic and Scandinavian Elements used in Place-Names on Ordnance Survey Maps of Scotland. Compiled by The Royal Scottish Geographical Society. $8\frac{1}{4} \times 5$. Pp. 12. Chessington: Director General of the Ordnance Survey, 1951. 2*s.*

In 1891 a Committee was appointed under the auspices of the Royal Scottish Geographical Society and presided over by Dr James Burgess, in connection with the revision of place-names appearing on the Ordnance Survey maps of Scotland. The Committee lapsed in 1899 and was revived and reconstituted in 1913, under the chairmanship of Dr W. J. Watson, Mr John Mathieson acting as Honorary Secretary. Successive Committees have carried on painstaking work on Scottish place-names, and one of the results is this useful Glossary, which includes also a list of common corruptions and mis-spellings of Gaelic names. Some Scandinavian elements in place-names are listed in their Old Norse forms. J. H. K.

A History of Scottish Farming. By T. Bedford Franklin. 7¼ ×5. Pp. ix +194. 14 plates. Edinburgh : Thomas Nelson and Sons Ltd, 1952. 12*s* 6*d*.

The story of Scottish farming is one of the happier chapters in that of man's struggle with his environment, for the prevailing high standard is the result of unremitting toil and of great faith and courage in the face of natural adversity. We are therefore fortunate in having Mr Franklin to sum up this story so clearly and concisely. This is an admirable little book and one that interests as well as instructs. Mr Franklin traces the development of farming in Scotland from prehistoric times to the post-war period, dealing very fully with the two main events, monkish farming and the agricultural revolution. The book is of such a high standard that it is all the more a pity there is so little attention to the facts of geography. This results in the impression that Britain is divided, agriculturally, into two homogeneous parts; divided along the Tweed, for the author is too prone to use " Scotland " where he means the East and South East, and " England " where he means Mercia and Wessex. H. P. W.

Highlands of Scotland. By Seton Gordon. 8½ ×5½. Pp. 328. 49 illustrations. Map. [The County Books.] London : Robert Hale Ltd, 1951. 18*s*.

This is one of the most informed books in the *County* series, for no one could be a better guide to the Scottish Highlands than Mr Seton Gordon. The book is packed with first-hand information, much of it unusual, on all aspects of the Highland scene : its bird-life, fisheries, folklore, history, piping, and so on. All these and much more are touched upon as the kilted guide swings us with him upon his hardy way, in all weathers, " o'er moor and fen, crag and torrent," till at last we are brought up short above the precipices which front the ocean at Cape Wrath.

The illustrations are excellent, but the map is rather inadequate. I. W. H.

Kayak to Cape Wrath. By J. Lewis Henderson. 7¼ ×5. Pp. 230. 21 photographs. 5 sketch maps. Glasgow : William McLellan and Co. Ltd, 1951. 15*s*.

This absorbing saga of how the author and a friend paddled their kayaks from Fort William to Cape Wrath and found pleasure in the journey as much as in the achievement may be placed beside the recent literary successes of our Scottish mountaineers. In penetrating sea-lochs and inland waterways, and portaging across stormy headlands, these intrepid sailors demonstrate the worthiness of their little craft, to which our attention and admiration is directed by the several photographs. Mr Henderson does not sufficiently exploit his talent for anecdote on his encounters with the West Coasters, and indulges too often in enthusiastic descriptions of that most inexpressible of scenery : the North West Highlands. A. G. M.

The Farne Islands : Their History and Wild Life. By Grace Watt, M.A., M.B.O.U. 8½ ×5½. Pp. 236. 4 figs. 33 photographs. London : Country Life Ltd, 1951. 30*s*.

Miss Watt is to be commended for her contribution, stimulating and written with an easy style. Prior to considering the various aspects of life on the islands, the author provides a most useful and interesting account of their environment and history. The major part of the book is devoted to the habits of birds, the text being accompanied by excellent illustrations. Details of the vegetation cover are included, also a most fascinating study of the grey seal. R. C.

Wanderings in the Pennines. By William T. Palmer, F.R.G.S., M.B.O.U., F.S.A. Scot. 8½ ×5½. Pp. 288. 31 illustrations by G. Douglas Bolton. End-paper map. London : Skeffington and Son Ltd, 1951. 15*s*.

Mr Palmer's latest book on rambling in England will be welcome to those who are fascinated by the austere beauty of the Pennines. He is indefatigable in following road, lane and footpath in all weathers and noting everything of interest in landscape, architecture, history and folklore. He talks to everyone he meets : miners, shepherds, farmers, parsons, storekeepers, etc., and he quotes liberally from other writers on the district. His area is southward from the Roman Wall to Airedale, all of which he has covered on foot, often camping on the way. There is an adequate map.

R. N. R. B.

Cheshire. By Fred H. Crossley. 8½×5½. Pp. xii+376. 49 illustrations. Map. [The County Books.] London: Robert Hale Ltd, 1949. 15*s*.

Cheshire is rapidly becoming the neglected country cousin of the sophisticated urban concentrations of Merseyside and Lancashire, but for anyone wishing to explore and enjoy this fascinating county, no companion could be more rewarding than this volume in which, while he mourns for an age that is gone, Mr Crossley indicates how many of the features of that age can be savoured still in the buildings and customs of the region. K. M. M.

Leicestershire. By Guy Paget, d.l., f.r.hist.s., and Lionel Irvine, m.b.e., m.a.(oxon.). 8½×5½. Pp. xii+307. 49 illustrations. Map. [The County Books.] London: Robert Hale Ltd, 1950. 15*s*.

"This book is not a text-book, nor a guide-book, but just a study of our county by two old men who were born and bred in it, and love it for no other reason." So the authors have written an intimate and valuable history of Leicestershire, which necessarily includes much about fox-hunting. But the statement that the water of the county is borne to Edinburgh by the Grand Junction Canal (pp. 1, 4) is somewhat puzzling. The information given concerning the influence of Robert Bakewell of Dishley on improvement of live-stock and the chapter on Charnwood Forest are likely to prove more interesting to the geographer, as are also the many good photographs. R. B. S.

Forgotten Ports of England. By George Goldsmith Carter. 8¾×5⅝. Pp. x+206. Photographs. 3 maps. End-paper plan of Rye. London: Evans Brothers Ltd, 1951. 21*s*.

"Forgotten Ports of the Saxon Shore" would perhaps be a happier title for a work limiting its scope to Suffolk, Kent and Sussex and a small portion of Hampshire. Within these limits the subject is very fully covered, and most attractively too. Along the Suffolk coast the author carries the reader with him, recapturing in full measure the present and past atmospheres of the desolate East Anglian shore. Imagination restores to life the marauding sea-rovers who, twice, first devastated and then settled the coastal strip between Yare and Stour. These ancestors of Mr Carter and his boyhood friends are not very far away: we sense he "belongs" to this Suffolk shore long before he tells us so. The chapters dealing with the forgotten ports south of the Thames reach a high standard but fall short of the Suffolk level. For all their charm Sandwich, Rye and Winchester wear a slightly sophisticated air. But is not much of the trouble that the author is no longer in the land of his boyhood?
C. V. R. G.

Dorset. By Eric Benfield. 8½×5½. Pp. x+232. 49 illustrations. Map. [The County Books.] London: Robert Hale Ltd, 1950. 15*s*.

The author does not confine himself to the description of present-day Dorset. He seeks to bring out the distinctive atmosphere of the county and the individuality of the Dorset folk, the result of a long history of settlement in a particular environment. Many of the chapters deal with historical events as they affected Dorset; the account of Maiden Castle is especially interesting. The geographical background, however, is inadequately treated; the map provided is inadequate compensation. R. B. S.

The Bailiwick of Jersey. By G. R. Balleine. 8×5¼. Pp. xxxi+170. 114 photographs. End-paper sketch map. [The King's Channel Islands.] London: Hodder and Stoughton Ltd, 1951. 12*s* 6*d*.

The King's Channel Islands, edited by P. M. de Veulle, may be regarded as an extension of the well-established *King's England* series. The volume on Jersey is commendable for the excellent gravure illustrations alone. The text, replete with information on different places in the Bailiwick, which are dealt with in alphabetical order, is preceded by an adequate and readable introduction to the island and associated islets. Although the historical aspect is paramount, much geographical matter may be gleaned from text and illustrations, and the book as a whole will be read and studied with pleasure by everyone interested in Jersey. J. H. K.

Færoerne : Folk og Erhverv. By Aa. H. Kampp. 8½×5¾. Pp. 112. 40 figs. [Geografkredsen.] København : Det Danske Forlag, 1950.

Although designed for Danish readers, this commendable survey of the physical and human geography of the Faeroes is of importance to all who are interested in the islands, of which it has been said that " if they had the climate of Capri, people would not travel to Capri." Illustrated with sketch maps, diagrams and photographs, the text provides a succinct and competent account of landforms, climate, flora and fauna, human population, occupations, land use, transport, power, and settlements. Some interesting comparisons are made between human activities in the Faeroes and in the Hebrides and Shetland. There is also a bibliography and brief glossary.

I. E. C.

The West European City : A Geographical Interpretation. By Robert E. Dickinson, M.A., PH.D. 8½×5½. Pp. xviii+580. 129 figs. 29 plates. [International Library of Sociology and Social Reconstruction.] London : Routledge and Kegan Paul Ltd, 1951. 42*s*.

In this outstanding contribution to geographical literature Professor Dickinson deals in a methodical, detailed and scholarly fashion with the European city north of the Alps and west of the Vistula. The first part of the book consists of a series of valuable town studies of a large number of well known and less known cities from Berlin to Poitiers. The second part is mainly a comparative study of the development and morphology of cities in NW and Central Europe. The book also deals with the methodology of urban geography and with general theories of urban development and town planning. Professor Dickinson is at his best in the town studies. Some of his generalisations, however, are not so happy, while his style does not make for easy reading. Though not without faults, the book will nevertheless be welcomed by geographers, planners and all those interested in large cities. The illustrations and exhaustive bibliography are a great asset.

H. P. W.

Belgium and Luxembourg. By Tudor Edwards. 8½×5½. Pp. vii+128. 109 illustrations. 2 sketch maps. London : B. T. Batsford Ltd, 1951. 15*s*.

Materially a beautiful production, worthy of the house that publishes it. The book itself is to be recommended to the general reader if it were only for the introduction, which gives a summary that would be hard to improve of the history, civilisation, religion, pageantry, and temperament of the Belgians. In its ten chapters the book treats of all Belgium, of French Flanders, and Luxembourg. The author's knowledge of all aspects of his subject is extensive and detailed, having been acquired by much study and by many journeys to out-of-the-way parts as well as to the more renowned centres.

The book is plainly not one to be read at a sitting : the material is so rich that one chapter at a time should suffice, but the tale is so varied and so interesting that the reader will always look forward to the next.

R. T. C.

Luxembourg : Land of Legends. By W. J. Taylor-Whitehead. 7½×5. Pp. xiv+130. 17 illustrations. End-paper sketch map. London : Constable and Co. Ltd, 1951. 12*s* 6*d*.

Though Luxembourg has experienced the domination of Celt, Roman, Burgundian, Frenchman, Spaniard, German, it has yet, as Winston Churchill said at the close of the last war, " the principle of vitality and personality " with a strong love of liberty. According to the well-informed and enthusiastic author of this pleasant book, the people of Luxembourg are a friendly lot and the country is a tourist's paradise, offering every variety of landscape and diversion. There is little emphasis on class distinction and, though the population numbers about half a million, there is no sense of overcrowding.

Description of land and people occupies only the first part of the book, the major part consisting of a selection from the countless legends associated with the city of Luxembourg and with the numerous smaller localities. An appendix contains in brief much information for the use of travellers.

R. T. C.

French Châteaux. By HENRI LEMAÎTRE. 12 ×9½. Pp. 39+224 photographs. London : B. T. Batsford Ltd, 1950. 50*s*.

Preceded by a brief but illuminating essay on the significance of the Château in the evolution of French civilisation, and by a series of historical and architectural notes dealing with each of the buildings represented, this magnificent collection of photographs of one hundred and nineteen of the great Châteaux is a brilliant tribute both to the culture of the *Ancien Régime* and to the pious care with which those royal or seigniorial dwellings have been either preserved or restored. G. P. I.

Mediterranean Background. By BERNARD NEWMAN. 8½ ×5½. Pp. 286. 64 illustrations. 10 sketch maps. London : Robert Hale Ltd, 1949. 16*s*.

There is much in this book for laymen and students alike, for besides providing good reading material it spotlights many of the facts and problems of the region. In this *Background*, the author draws upon many sources of information, not least of which are his own observations and experiences. As intended, the picture is broad, but numbers of titbits provide additional details and add spice to the reading. Maps and photographs are conventional, although the presentation of text material is original. R. C.

UNION OF SOVIET SOCIALIST REPUBLICS

Geography of Russia. By N. T. MIROV. 9×6. Pp. xii+362. 34 maps. New York : John Wiley and Sons Inc. London : Chapman and Hall Ltd, 1951. 52*s*.

The title of this book, by a lecturer in the University of California, is misleading. It would be more accurate to call it a physical, biological, and ethnographical geography of the U.S.S.R., since the author includes the whole of the U.S.S.R. and makes no attempt to deal with mining and industry, transport, communications, and settlements, while agriculture and population density and distribution receive scant attention.

The first quarter of the book comprises short general chapters on location, geology and topography, rivers and lakes, historical geography, peoples, languages, religions. The rest of the book, styled (Part III) Geographic Regions—more accurately natural regions—consists of seven chapters on the lowland and fourteen on the mountain regions, the divisions being made according to a slightly modified version of Berg's classification. The book includes a number of useful distribution maps which, together with the systematic arrangement and the terse style of writing, make it convenient as a reference book, particularly in the field of biogeography. C. P. S.

ASIA

The Scottish Himalayan Expedition. By W. H. MURRAY. 8½ ×5½. Pp. xiii+282. 4 colour plates. 32 half-tone plates. 11 sketch maps and diagrams by Robert Anderson. London : J. M. Dent and Sons Ltd, 1951. 30*s*.

This is an account by the leader of the Scottish expedition to the Garwhal and Almora districts in 1950. The four members of the expedition all had wide experience of Scottish and considerable experience of Alpine conditions, but none of them had climbed before in the Himalaya. They did not go out with the object of attempting any specific peaks but rather with the idea of exploring the country and climbing any peaks which appeared to be practical. Five separate mountains were ascended. The area explored included the Nanda Devi Cirque and the gorge of the Girthi River.

The party included two expert photographers, and some of the members had expert knowledge of botany and zoology. Their observations on the wild life and the different tribes met in the course of their journeys will make an appeal not only to mountaineers but to a wider public. The illustrations are of a very high standard. The style is good, and the book will take its place in mountaineering literature. A. H.

The Far East: A Social Geography. By A. D. C. Peterson, o.b.e., b.a. 8½×5½. Pp. 336. 43 illustrations. 25 and end-paper sketch maps. London: Gerald Duckworth and Co. Ltd, 1949. 21*s.*

The title is misleading: the work is an introduction chiefly to the politics, history and economics of the countries of south and east Asia and of the East Indies. The author recommends his readers to "look up" climate and structure in such books as Professor Dudley Stamp's *Asia.* Apart from a number of blemishes including the revival of the term "Caucasian race" and inadequate keys to certain maps, the book is very readable and excellent for those wishing to acquire a broad outline of the major problems of the Far East. W. B. M.

INDIAN OCEAN

Arab Seafaring in the Indian Ocean in Ancient and Early Medieval Times. By George Fadlo Hourani. 8½×5½. Pp. viii+131. 8 plates. 7 sketch maps. [Princeton Oriental Studies, Vol. 13.] Princeton, N.J.: Princeton University Press, 1951. $3.00. London: Geoffrey Cumberlege, Oxford University Press. 20*s.*

Brief but scholarly, this excellent monograph draws upon Greek, Arab, Chinese, and Indian sources, and upon French and German commentaries, in presenting a general account of the contribution made by the Arabs to the development of trade routes in the Indian Ocean prior to the entry of the Portuguese. The work falls into three sections: The first deals with pre-Islamic times, when Arabian peoples played a subordinate rôle to Alexandrian Greeks and Persian seafarers in the changing pattern of trade based on the Red Sea and Persian Gulf; the second records the remarkable release of latent energies consequent upon Arabian society assuming the word and sword of Islam; the third deals more particularly with the vessels used in the development of sea trade.

At times the author lapses into a mere listing of authorities, but in general carefully assesses the relative value of his source material. One could have wished for fuller treatment of Arab seafaring in the eastern waters of the ocean, and for more lively cartography in the period maps which appear in the text. But set against these detractions are good plates of early ship types and an approach which makes the volume of great value to the historical geographer. W. K.

Fourteen Men: The Story of the Australian Antarctic Expedition to Heard Island. By Arthur Scholes. 8½×5½. Pp. x+273. 21 illustrations. 2 sketch maps. London: George Allen and Unwin Ltd, 1951. 15*s.*

The fourteen men of this book were the staff of a meteorological, magnetic and cosmic ray observatory founded in 1947 by the Australian Government on Heard Island, about 280 miles SE of Kerguelen. The island has been little explored since its discovery by an American sealer about a century ago, but for a time was visited by sealers. The *Challenger* called in 1874, and H. N. Moseley gives a good account of Heard Island; in 1902, von Drygalski was there; in 1929, Sir Douglas Mawson called, and that almost concludes the list of visitors.

In this desolate rain- and wind-swept spot the expedition was landed, and a number of huts were built and radio masts were erected. Among other work, the island was re-charted, but the map in this book is very poor. There is a great deal about seals and birds, but we find it hard to accept the statement that the leopard seals are timid: our experience was the reverse. On the scientific side the book has little about the island, but as a tale of adventure it can be commended. Men have seldom inhabited a more dismal spot. R. N. R. B.

AFRICA

Mauretania: Warrior, Man, and Woman. By Sacheverell Sitwell. 8½×5½. Pp. 328. 21 photographs by Lady Alexandra Metcalfe. London: Gerald Duckworth and Co. Ltd. Third impression, 1951. 21*s.*

A reprint of the author's interesting account of his travels in North Africa, first published in 1940 and reviewed in the *S.G.M.*, 56 (*3*): 131. J. H. K.

Ex-Italian Somaliland. By E. Sylvia Pankhurst. Foreword by Peter Freeman, M.P. $8\frac{1}{2}\times5\frac{1}{2}$. Pp. 460. 21 illustrations. 5 sketch maps. London : C. A. Watts and Co. Ltd, 1951. 12*s* 6*d*.

Geographically the main interest of this book lies in Italy's attempts to enlarge her territory at the expense of Ethiopia. The frontier was altered in Italy's favour in a most high-handed manner, under the assumption that any Ethiopian territory occupied by Italian troops became ipso facto Italian. The League of Nations acted in a very futile way after the Wal Wal incident in 1934 and, rather than alienate Italy, chose injustice to Ethiopia.

The book could have been considerably abbreviated without losing any of its propaganda value, but is good value for the price. J. M. M.

Congo Eden. By Mary L. Jobe Akeley, A.M., Litt.D., F.R.G.S. Foreword by Professor William King Gregory. $8\frac{1}{2}\times5\frac{1}{2}$. Pp. xv+356. 13 illustrations. Map. London : Victor Gollancz Ltd, 1951. 18*s*.

Mary Akeley had accompanied her naturalist husband on an extensive collecting expedition some twenty years ago in the area which is now, thanks in part to his efforts, the Albert National Park. He died there, and the main object of the journey described in the present book was to visit his tomb. This alone gives any unity to the book, as otherwise it is an extraordinary mixture of snippets of natural history, much of it brought in from other authorities and having nothing to do with the journey, of travel experiences, personal reactions to events, and sheer trivialia. Countless people are brought in by name, and the author's husband, Carl Akeley, is quoted in such an impersonal way that the reader has the curious impression that he was a mere scientific acquaintance.

The point that emerges perhaps more clearly than any other is the way the Belgians have made themselves at home in the Congo. R. M.

South African Scenery : A Textbook of Geomorphology. By Lester C. King, Ph.D., D.Sc., F.R.S.(S.A.). $8\frac{3}{4}\times5\frac{5}{8}$. Pp. xxxi+379. 79 figs. 267 plates. Coloured map. Edinburgh and London : Oliver and Boyd Ltd. Second edition, revised, 1951. 45*s*.

The first edition of this book was reviewed in 1943 [*S.G.M.*, 59 (*1*) : 44], but a great part of the volume has now been rewritten. It falls into two main parts : the first, a text-book of geomorphology with illustrations largely from South Africa, and the second part a more or less regional account of the landforms of South Africa. The main changes in the book are those which incorporate the author's recent studies into the new concept of pediplanation, of which he is now the principal exponent. He also brings together and simplifies his and Dr Dixey's work on African land-surfaces. Neither topic can be regarded as having reached finality. While criticising Professor King on many points of detail, one cannot but be grateful to him for marshalling so much new material and making simplifying generalisations. Without doubt he has done a great service to African studies.

The photographic illustrations are particularly fine and form an illustrated geography of Southern Africa in themselves. R. M.

Journals of Andrew Geddes Bain. Trader, Explorer, Soldier, Road Engineer and Geologist. Edited, with biographical sketch and footnotes, by Margaret Hermina Lister. $8\frac{1}{2}\times5\frac{1}{2}$. Pp. xxxix+264. 19 illustrations. 4 maps. Cape Town : Van Riebeeck Society [Vol. 30], 1949. 20*s*.

" Trader, Explorer, Soldier, Road Engineer and Geologist "—these terms in the title denote the many activities of Thurso-born Andrew Geddes Bain, the record of whose pioneering life and work in South Africa from 1816 to 1864 is presented in this volume. But the significant impression which remains with the reader is of a man with an overwhelming capacity for enjoyment, whose infectious good humour smoothed over the many difficulties which resulted from his unruly pen and tongue. The well-selected extracts from Bain's writings are preceded by a short biography, which supplies a much needed thread of continuity but which could have been rendered more valuable by the inclusion of a good map for the guidance of those not conversant with the detail of expanding colonisation in South Africa. K. M. M.

ATLANTIC OCEAN

North Atlantic : Boat against Boat over 3,000 Miles. By ADLARD COLES. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. 191. 9 figs. 30 plates. End-paper chart. Southampton : Robert Ross and Co. Ltd. London : George G. Harrap and Co. Ltd. Second edition, 1951. 15*s* 6*d*.

The many who are interested in ocean racing in small boats will find this a thrilling book. From Bermuda to Plymouth was the longest run and a magnificent achievement. A shorter but very exciting run was from Newport, Rhode Island, to Bermuda. The maps and photographs are excellent. R. N. R. B.

AMERICA

The Westward Crossings : Balboa, Mackenzie, Lewis and Clark. By JEANETTE MIRSKY. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. xv + 365 + xiii. 21 illustrations. 3 maps. London : Allan Wingate (Publishers) Ltd, 1951. 21*s*.

The journeys of Balboa, Mackenzie, and Lewis and Clark, each actuated by different motives, marked three steps in the pioneer exploration of North America. All were inspired by the hope of gain, but in different distinctive currencies. Balboa sought gold and silver, Mackenzie furs, and Lewis and Clark a trade route to the west. The stories are well told from original sources and give a vivid picture of past days in America. Miss Mirsky has given us another accurate and scholarly volume on the history of geography. R. N. R. B.

An Introduction to the Geography of the Canadian Arctic. By J. L. ROBINSON, N. L. NICHOLSON, J. K. FRASER, B. V. GUTSELL, and D. LEECHMAN. $9\frac{1}{4} \times 6$. Pp. xiii + 118. 18 maps and diagrams. 17 plates. [Canadian Geography Information Series No. 2.] Ottawa : Geographical Branch, Department of Mines and Technical Surveys, 1951. $0.50.

It is high time that the northern latitudes of the world received a little more attention from geographers. Here is a compilation from personal experience that puts the Arctic regions of Canada in true perspective. Many authors have taken part under the general editorship of Dr J. Wreford Watson, the geographer to the Canadian government. It is an excellent work and abundantly provided with clear and modern maps. In these days of excessive prices, the cheapness of this book is worth noting. R. N. R. B.

Chile. An Outline of its Geography, Economics, and Politics. By GILBERT J. BUTLAND. $8 \times 5\frac{1}{4}$. Pp. vii + 128. 7 figs. London and New York : Royal Institute of International Affairs, 1951. 12*s* 6*d*.

A factual study of Chile with a geographical flavour is welcome, since much that is written on that country shows national or financial bias. There is also a brief discussion of social conditions and the relations of Chile with other states, including the baseless claim to Grahamland which the Chileans call O'Higgins Land. General sketch maps and a useful bibliography complete the book. R. N. R. B.

OCEANIA

The Pacific Islands. By DOUGLAS L. OLIVER. $9\frac{1}{2} \times 6\frac{1}{4}$. Pp. xi + 313. Decorations and sketch maps by Sheila Mitchell Oliver. Cambridge, Massachusetts : Harvard University Press, 1951. $5.00. London : Geoffrey Cumberlege, Oxford University Press. 32*s* 6*d*.

Mr Oliver presents an excellent account of the past of the Pacific islands, their present condition, and a forecast of future lines of development. The style is serious but popular, hard facts and figures being avoided. Allocation of space to the various groups is well balanced, but Australia is rather surprisingly brought within the scope of this book. *The Pacific Islands* will be read with pleasure and benefit by the general reader seeking information about this area. C. R. V. G.

Beyond the Southern Lakes : The Explorations of W. G. Grave. Edited by ANITA CROZIER. Foreword by Sir T. A. Hunter. 8½×5½. Pp. 124. 11 illustrations. End-paper sketch map. Wellington, N.Z. : A. H. and A. W. Reed, 1950. 12*s* 6*d*.

This book contains an account of the explorations of W. G. Grave in the mountainous area of south western Otago, at the turn of the century. Quotations from Grave's diaries form the bulk of the book, material from other sources being used where necessary. Though the account can be followed in a general way on the diagram of the region given, the reader often regrets the omission of a more detailed map. However, the exploration of an unknown area, under difficult conditions, is sufficiently interesting in itself to make the book worth reading. A. G. C.

POLAR REGIONS

I married an Explorer. By MIRIAM MACMILLAN. 8¼×5¼. Pp. 238. 31 illustrations. London : Hurst and Blackett Ltd, 1951. 15*s*.

Donald McMillan has made many voyages in the Arctic including his famous Crocker Land search of 1913-17. On some of his later and shorter journeys to Labrador, Baffin Island, and Northwest Greenland, he took his wife with him, and now she has written of his voyages to these lands. There is nothing new in the book and disappointingly little about the Polar Eskimo of Northern Greenland. She might have written of the domestic side of the explorer's life, but there is little of this. It is rather a narrative that differs little from a score of others, but without any details of discovery. A pleasant readable book, imbued with enthusiasm and good nature, but not of great importance. R. N. R. B.

BIOGEOGRAPHY

Zoogeography of the Land and Inland Waters. By L. F. DE BEAUFORT. 8½×5½. Pp. viii +208. 10 figs. [Text-Books of Animal Biology.] London : Sidgwick and Jackson Ltd, 1951. 30*s*.

In accounting for the discontinuous distribution of species it was, in the past, the custom to postulate land bridges in earlier ages. But geologists would not admit the existence of many of these, and in consequence zoologists had to find other explanations. As early as 1856, Darwin strongly objected to many of these land bridges. Some no doubt did occur, and the somewhat discredited Wegener theory accounts for others in providing horizontal as well as vertical earth movements. This text-book brings our knowledge up to date. It is a technical book of scholarly standard and should be of great value to zoogeographers and to professional zoologists. There is a useful bibliography. R. N. R. B.

A World Dictionary of Breeds, Types, and Varieties of Livestock. By I. L. MASON, B.A. (CANTAB.). 9¾×6¼. Pp. 272. [Technical Communication No. 8 of the Commonwealth Bureau of Animal Breeding and Genetics, Edinburgh.] Farnham Royal : Commonwealth Agricultural Bureaux, 1951. 30*s*.

Although the geographer can avail himself of maps showing the distribution of certain breeds of livestock in a limited number of countries, he has not until now had the advantage of a comprehensive work of reference informing him of the distribution of buffalo, cattle, sheep, goat, horse, ass, and pig breeds throughout the world. Moreover, the multitude of synonymous names of individual breeds or varieties, and a lack of consistency in terminology, have been a handicap.

The present *Dictionary* satisfies a long-felt need. In the first part are listed, alphabetically under each species, more than 4000 names of breeds, types and varieties. When names are synonymous, one form is recommended for use in English. Description of breed characters is wisely restricted to traits least affected by the environment, and information is also given as to place of breeding, origin, and relation to other breeds. In the second part, the different breeds of livestock are listed for each country, together with statistics and adequate references. This is a very serviceable condensation of many years of painstaking study. J. H. K.

EDUCATIONAL

Geography in the Secondary School, with special reference to the Secondary Modern School. By E. W. H. Briault and D. W. Shave. Foreword by Leonard Brooks. 9½×6. Pp. 36. Sheffield: The Geographical Association, 1952. 2*s*. post free.

Prepared at the request of the Executive Committee of the Geographical Association, this report provides the teacher of geography with guidance on the place of geography in the field of education, the principles of good geography teaching, out-of-doors studies, and equipment. A short bibliography on teaching methods and information about Ordnance Survey and other maps are appended. I. E. C.

Outlines of General Geography. By E. O. Robinson, M.A. 7½×5¼. Pp. xi+239. 101 photographs, diagrams, and maps. London: Macmillan and Co. Ltd, 1951. 7*s* 6*d*.

In this book is outlined a course in general geography suitable for the fourth year in Scottish secondary schools. The essential facts of the earth's position in the universe, structure, landforms, climate, and major natural and human regions are clearly given, and are illustrated with excellent diagrams and photographs, some of which, of the juxtaposition 'before and after' type, suggest to the reader ways of making and using his own illustrative material. The chapters on cultivation, minerals, power, and trade are good though short, while appendices contain useful statistics and exercises. B. B. H.

The Earth's Crust: A New Approach to Physical Geography and Geology. By L. Dudley Stamp, C.B.E., B.A., D.SC. Foreword by Isaiah Bowman. 9¾×7½. Pp. viii+120. 74 figs. 32 coloured plates. London: George G. Harrap and Co. Ltd, 1951. 18*s*.

In this fresh approach to physical geography and its underlying geology, the author deals with his subject under four headings. He first describes the carving of a land surface by weathering, denudation and transport. The second section deals with earth movement, mountain building and vulcanicity. In the third section there is an admirably clear account of the reactions between geological constitution and structure on the one hand and climate on the other. The fourth part treats of rocks and minerals as raw materials for man.

The outstanding feature of the book is seen in the illustrations. The text-figures are clear, and the plates are veritable works of art, showing three-dimensional models of selected localities, coloured appropriately and including even the vegetation and the works of man. R. M. C.

Physical Geography. By Arthur N. Strahler. 11×8½. Pp. ix+442. Illustrated. New York: John Wiley and Sons Inc., 1951. $6.00. London: Chapman and Hall Ltd. 48*s*.

An excellent general text-book of physical geography. The field covered is as extensive as could well be desired, and each topic starts from the simplest elements. The standard reached is senior school or junior university classes, the text and exercises being rather of the former level, but the numerous excellent maps, photos and diagrams have such a wealth of material in them that the book in this respect could well serve students throughout a geography course. It is exactly the book for one who, having had no formal training in the subject, yet wishes to learn something of physical geography. R. M.

France: A Regional and Economic Geography. By H. Ormsby, D.SC.(ECON.) 8½×5½. Pp. xiv+525. 103 figs. London: Methuen and Co. Ltd. New York: E. P. Dutton and Co. Inc. Second edition, revised, 1950. 25*s*.

Essentially a reprint of the first edition [see *S.G.M.*, 1932, 48 (2): 123-124], this well-established text-book has undergone some revision, particularly of the section dealing with economic distributions. The statistics have been revised by Mr F. J. Monkhouse, who has added a valuable summary of economic conditions, 1939-1947. The book maintains its utility for teachers and university students, for whom it was primarily written. I. E. C.

A Regional Geography of Ceylon. By S. F. DE SILVA, B.A. Foreword by L. McD. Robison. 8×5½. Pp. xi+264. 97 figs. Colombo : The Colombo Apothecaries' Company Ltd. Revised edition, 1949. *Rs* 4.

Although written for students of the Government Training College, Colombo, this account of the geography of Ceylon can be recommended for the use of teachers and students elsewhere. Several new chapters have been added and statistics brought up to date since publication of the original edition (1936). There are appendices dealing with a geographical interpretation of Ceylon history, the geographical factor in the economic development of Ceylon, and the soils and their utilisation for crops. The text figures, including some photographs—although in several instances poorly reproduced—are essential to the utility of this book. I. E. C.

Exploration and Adventure. By CLIFFORD COLLINSON, F.R.G.S. 7½×5. Pp. 151. Illustrated. Decorative end-paper maps. London : George Allen and Unwin Ltd, 1951. 3*s* 6*d*.

The re-issue of Mr Collinson's introduction to the history of exploration [*S.G.M.*, 1934, 50 (*4*) ; 256] is welcome. The exploits of Leif Ericson, Marco Polo, Columbus, Pizarro, Magellan, Drake, Cook, Mungo Park, Livingstone, Nansen, and Scott cast a spell over each rising generation and are here vividly presented by an author already known to children by his broadcast talks. I. E. C.

GENERAL

Vergleichende Länderkunde. By NORBERT KREBS. 9×6. Pp. xx+484. 18 maps. [Geographische Handbücher.] Stuttgart : K. F. Koehler Verlag, 1951.

In this book Professor Krebs has left us a stimulating example of the scope of the comparative method in Geography. About two-thirds of it consists of essays of masterly order and precision, in which he treats not only of such comparisons as the Baltic and Laurentian Shields, the Congo and Amazon Basins, but also of Anglo- and Latin-America, and the Indian and Chinese cultural provinces. The introductory part provides a comparative treatment of broad topics in physical and human geography, but unfortunately there is no summary. Some of the drawbacks of the method are clearly implied, especially as it leads often to a rather natural deterministic approach, hardly veiled by its metaphorical camouflage. But it is a carefully balanced book and deserves critical study by all geographers. C. A. H.

Geography, Justice, and Politics at the Paris Conference of 1919. By CHARLES SEYMOUR. Introduction by Roland L. Redmond. 8¾×6. Pp. iv+24. [Bowman Memorial Lectures, Series One.] New York : The American Geographical Society, 1951. $1.50.

This is the inaugural lecture of a series which has been endowed to commemorate the name of Isaiah Bowman. The lecture is of great interest historically for the light it throws on the struggle at Versailles in 1919 between President Wilson on the one hand and the European statesmen on the other. The efforts made by the geographers present as advisers to achieve compromises here and there between conflicting ideas and interests are well brought out. The outcome can be read in the history of the subsequent twenty years. S. C. F.

Exploration and Discovery. By H. J. WOOD, B.SC., PH.D. 7½×4¾. Pp. 192. 10 figs. End-paper sketch maps. London : Hutchinson's University Library, 1951. 8*s* 6*d*.

This is an excellent introduction to the study of exploration from the earliest times. No attempt has been made in such small compass to cover the entire field, but attention is concentrated on certain major episodes in widely scattered regions. Space is too limited to permit any adequate reference to work in the interior of the Americas and Australia, or in Siberia and Central Asia. There is a most useful chapter on the history of navigation. C. R. V. G.

ATLASES AND MAPS

The Oxford Atlas. Edited by Brigadier Sir CLINTON LEWIS, O.B.E., Colonel J. D. CAMPBELL, D.S.O., with the assistance of D. P. BICKMORE and K. F. COOK. 15½×10½. Pp. 96+xxvi (Distribution Maps) +90 (Gazetteer). London: The Oxford University Press, 1951. 30*s*. School Edition, 25*s*.

The choice of scales and areas for particular maps in this much-heralded atlas has resulted in better cover for many regions than is found in comparable atlases. Africa, in particular, receives generous treatment as do, for instance, France and the U.S.A. Canada, on the other hand, is covered less satisfactorily than in the old *Oxford Advanced Atlas*. Projections used are explained in preliminary notes and appear carefully chosen, although many will share the reviewer's dislike of the divided projection used for some world distributions. The new layer colour scheme, omitting contour lines, is easy on the eye but will irritate many by its lack of precision made worse by bad registration and uneven colour of some of the plates.

Some interesting land use maps are included which must have involved much work in compilation. The world vegetation map is a great advance on those in similar atlases, but the climate maps are less satisfying.

A new atlas inevitably contains mistakes, but *The Oxford Atlas* has more than is excusable. Lack of space forbids examples, but the reviewer noted the misplacement of places, mis-spelling of names, and inconsistent omission of railways. It is a great pity that what ought to be a substantial contribution to British cartography should be marred by such lapses. H. A. M.

A Palaeographical Atlas of the British Isles and Adjacent Parts of Europe. By LEONARD J. WILLS. 8½×11. Pp. 64. 22 plates. Glasgow and London: Blackie and Son Ltd, 1951. 21*s*.

All those at all interested in geology should welcome Professor Wills' atlas, and students should find it a stimulating supplement to stratigraphy texts. Its maps, with accompanying explanation, give a clear—if not always acceptable—summary of the past geographies of the British Isles. Geographers will be particularly interested in those plates which refer to the Tertiary and Quaternary, and even those with little geological knowledge should be able to understand the material presented. The plates are well drawn and pleasantly reproduced in three colours; the whole is nicely printed and bound. H. A. M.

Atlas von Niederösterreich. Issued by the Kommission für Raumforschung und Wiederaufbau der Österreichischen Akademie der Wissenschaften, and Verein der Landeskunde von Niederösterreich und Wien. Edited by Dr ERIK ARNBERGER. 16×22¼. Part I. 20 map-sheets. Wien: Kartographische Anstalt Freytag-Berndt und Artaria, 1951.

With the exception of eight phenological maps (1 : 1,000,000), the maps of this notable atlas of Lower Austria are on a scale of 1 : 500,000. An effective method of representing the landforms is displayed in the first map. The latter is followed by maps showing administrative boundaries, geographical regions, phenology, and forest, grass, and arable land. Eight sheets dealing with agricultural production are also well designed. Three maps give a clear picture of, respectively, industry in Lower Austria, and in the Vienna Basin, and the production and distribution of electricity. The final map shows the territorial development of the 'Mark' and Duchy of Austria.

The individual maps have been designed by different experts, and the reproduction, in colour, is also satisfactory. The atlas as a whole is of a high standard both from the geographical and the cartographical point of view. J. H. K.

Main Areas of Tea Production. 18×28. Prepared by Geographia Ltd. London: The Tea Bureau, 1950.

A simple and effective map which fulfils its purpose admirably and in a colourful manner. South Asia, the Far East, and East Africa, which produce more than 99 per cent. of the world's tea, are covered, while all main producing areas are located and named. Production and export figures are listed, and comparison is aided by graphic representation. J. C. B.

THE GEOGRAPHICAL ASSOCIATION

The annual subscription for Edinburgh members of the Geographical Association has been increased from 7*s* 6*d*. to 12*s* 6*d*, beginning September 1952.

For 1952-1953, therefore, those desiring *joint membership* of the Royal Scottish Geographical Society and the Geographical Association, Edinburgh Branch, will be required to pay the following *total* subscriptions :—Ordinary Members : 42*s* 6*d*. Associate Members : 25*s*.

ROYAL SCOTTISH GEOGRAPHICAL SOCIETY

ROYAL PATRONAGE

HER MAJESTY THE QUEEN has been graciously pleased to grant her patronage to the Society.

PROCEEDINGS

MEETING OF COUNCIL was held on 3rd June 1952.

ANNUAL GENERAL MEETING

The Annual General Meeting will be held in the Society's Rooms in Edinburgh on Tuesday, 7th October 1952, at 4 P.M.

LECTURE SESSION, 1952-53

OCTOBER-DECEMBER, 1952

EDINBURGH, *Usher Hall*

EVENING MEETINGS, at 7.30 P.M.

October	16th.	Sir ROBERT BRUCE LOCKHART, K.C.M.G., on "Czechoslovakia of Yesterday and To-day".
November	13th.	URSULA GRAHAM BOWER, on "The Unexplored Hills of Northern Assam".
December	11th.	RITCHIE CALDER, C.B.E., on "Desert and Jungle—Exploring for United Nations".

Central Hall, Tollcross

AFTERNOON MEETINGS—Wednesdays, at 3 P.M.

October	22nd.	ISOBEL W. HUTCHISON, LL.D., F.R.S.G.S., on "A Stroll from Edinburgh to London".
November	5th.	W. B. MORGAN, B.A., on "From the Cape to Nairobi by Car".
November	19th.	J. H. BAXTER, M.A., B.D., D.D., on "Turkey: Old and New".
December	3rd.	N. MILLER, PH.D., on "Recent Impressions of Canada".
December	17th.	W. KIRK, B.A., on "The British Interlude in Burma".

The Society's Rooms

NEW DEVELOPMENTS IN GEOGRAPHY—Thursdays, at 5.15 P.M.

October	23rd.	Professor ALEXANDER K. CAIRNCROSS, C.M.G., M.A., PH.D., on "Scotland's Industrial Prospects".
November	6th.	F. P. TINDALL, M.A., A.M.T.P.I., on "The Development of East Lothian".
December	4th.	HENRY WOOD, M.A., PH.D., F.R.S.E., on "The Herring Industry".

JUNIOR MEMBERS' MEETINGS—Tuesdays, at 7.30 P.M.

October	28th.	JAMES HOSSACK, M.A., B.COM., on "Industrial Films".
November (Wed.)	26th.	Visit to Calton Hill Observatory.
December	16th.	P. W. G. GUNN, on "The Natural History of Edinburgh and District".

Synod Hall

FILM SHOWS FOR YOUNG PEOPLE

Saturdays, December 20th and 27th, at 10.30 A.M.

GLASGOW, *Lyric Theatre*, at 7.30 P.M.

October 15th. Sir ROBERT BRUCE LOCKHART, K.C.M.G., on "Czechoslovakia of Yesterday and To-day".
November 12th. URSULA GRAHAM BOWER, on "The Unexplored Hills of Northern Assam".
December 17th. RITCHIE CALDER, C.B.E., on "Desert and Jungle—Exploring for United Nations".

ABERDEEN, *Y.M.C.A. Hall*, at 7.45 P.M.

October 14th. NIALL RANKIN, on "A Wild Goose Chase".
November 11th. URSULA GRAHAM BOWER, on "The Unexplored Hills of Northern Assam".
December 9th. RITCHIE CALDER, C.B.E., on "Desert and Jungle—Exploring for United Nations".

DUNDEE, *Training College Hall, Park Place*, at 7.30 P.M.

October 15th. NIALL RANKIN, on "A Wild Goose Chase".
November 10th. URSULA GRAHAM BOWER, on "The Unexplored Hills of Northern Assam".
December 10th. RITCHIE CALDER, C.B.E., on "Desert and Jungle—Exploring for United Nations".

NEWBIGIN PRIZE: 1953 AWARD

A Bronze Medal and Money Prize will be awarded for the best Essay, suitable for publication in *The Scottish Geographical Magazine* and not exceeding 7000 words in length, on any subject relating to the geography of Scotland.

Essays, typed and with any illustrations prepared for reproduction, in envelopes marked "Newbigin Prize," must be lodged with the Secretary, Royal Scottish Geographical Society, Synod Hall, Edinburgh 1, on or before 31st October 1953.

NOTICE

In view of the great demand from overseas, the following numbers of *The Scottish Geographical Magazine* are very urgently required:

Vol. **2**, Nos. 3, 10, 11; Vol. **13**, No. 11; Vol. **19**, Index; Vol. **20**, Nos. 1, 5; Vol. **22**, Nos. 3, 6; Vol. **25**, No. 8; Vol, **26**, No. 3; Vol. **34**, Nos. 3, 4, 10, 12; Vol. **35**, Nos. 1, 2, 3, 8, 9; Vol. **36**, No. 1; Vol. **37**, Nos. 1, 2, 4; Vol. **40**, Nos. 2, 4; Vol. **41**, Nos. 1, 2, 6; Vol. **47**, No. 6; Vol. **53**, No. 1; Vol. **58**, Nos. 1, 2, 3; Vol. **59**, Nos. 1, 2; Vols. **58-59**, Index; Vol. **60**, No. 2; Vol. **61**, No. 2; Vols. **60-61**, Index; Vol. **62**, No. 3.

Bound volumes will also be gratefully accepted. It would be much appreciated if such copies of separate numbers and of volumes be handed without delay to the Secretary.